

FOOD TECHNOLOGY ABSTRACTS

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ABBREVIATIONS

A	ampere	g	gram	qt	quart
AAS	atomic absorption Spectrometry	GC	gas chromatography	R	rontgen
abstr.	abstract	gn	gravity	rad	rad or radian
ad lib.	ad libitum	gal	gallon	ref.	reference(s)
ADP	adenosine diphosphate	gf	gram-force	rev/min	revolutions per minute
Anon.	Anonymous	GLC	gas-liquid chromatography	RH	relative humidity
AOAC	Association of Official Analytical Chemists	h	hour	RNA	ribonucleic acid(s)
approx.	approximately	ha	hectare	S.	south, Southern, etc.
atm	atmosphere	HDPE	high density polyethylene	s.d.	standard deviation
ATP	adenosine triphosphate	hl	hectolitre [100 l]	SDS	sodium dedecylsulphate
a_w	water activity	hp	horse power	s.e.	standard error
BHA	butylated hydroxyanisole	HPLC	high performance/pressure liquid chromatography	s	second [time]
BHT	butylated hydroxytoluene	HTST	high temperature short time	SNF	solids-not-fat
BOD	biological oxygen demand	Hz	hertz [frequency cycle/s]	sp., spp.	species
b.p.	boiling point	in	inch	sp.gr.	specific gravity
Btu	British thermal unit	IR	infrared	summ.	summary
c-	centi- [as in cm, cm ² , cm ³]	IU	international unit	Suppl.	Supplement
cal	calorie	J	joule	t	metric tonne
cd	candela	k-	kilo- [as in kcal, kg]	temp.	temperature
Ci	curie	K	Kelvin	TLC	thin layer chromatography
CMC	carboxymethyl cellulose	l	litre	TS	total solids
COD	chemical oxygen demand	lb	pound	UHT	ultra-high temperature
coeff.	coefficient	lb	pound-force	UV	ultraviolet
conc.	concentrated	LDPE	low density polyethylene	V	volt
concn.	concentration	m-	milli- [as in mg, ml, mm]	var.	variety
cv.	cultivar	m-equiv	milli-equivalent	vol.	volume
cwt	hundredweight	m	molar concentration	v/v	volume/volume
d-	deci-	M-	mega- [as in Mrad]	w	watt
DE	dextrose equivalent	max.	maximum	W.	West, Western, etc.
detn.	determination	min	minute [time]	WHO	World Health Organization
DFD	dark firm dry	min.	minimum	w/v	weight/volume
diam.	diameter	mol	mole	wk	week
dil.	dilute	mol.wt	.molecular weight	wt.	weight
DM	dry matter, Deutsche Mark	m.p.	melting point	yd	yard
DNA	deoxyribonucleic acid(s)	MPN	most probable number	yr	year
dyn	dyne	MS	mass-spectrometry	μ	micro-[as in g, m]
E.	East, Eastern, etc	n-	nano-[10 ⁻⁹ , as in nm]	%:	per centum
ECD.	electron capture detection	N	Newton [kg m/s ²]	>	greater than
EDTA	ethylenediaminetetra acetic acid	N.	North, Northern, normal concentration	$\geq$	greater than or equal to;
Eh	oxidation-reduction potential	NMR	nuclear magnetic resonance	<	not less than
ELISA	enzyme-linked immunosorbent assay	NPU	net protein utilization	$\leq$	less than or equal to;
f-	femto-[10 ⁻¹⁵ , as in fCi]	oz	ounce		not greater than
$^{\circ}$ F	degree Fahrenheit	p-	pico- [10 ⁻¹² , as in pCi]	Chemical symbols are used for all elements	
FAO	Food and Agricultural Organization	P	poise	ABBREVIATIONS FOR LANGUAGE	
FDA	Food and Drug Administration	P	probability	Language of text	
FID	flame ionization detection	P	Pascal [N/m ²]	Dutch	Nl
fl oz	fluid ounce	PAGE	polyacrylamide gel electrophoresis	French	Fr
f.p.	freezing point	PER	protein efficiency ratio	German	De
ft	foot, feet	p.p.b.	parts per billion	Italian	It
		p.p.m.	parts per million	Japanese	Ja
		PSE	pale soft exudative	Norwegian	No
		PTFE	polytetrafluorethylene	spanish	Es
		PVC	polyvinyl chloride	swedish	Sv
		PVDC	polyvinylidene chloride		

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conc.	concentrated
concn.	concentration
cv.	cultivar
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gn	gravity
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HDPE	high density polyethylene
hl	hectolitre [100 l]
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Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
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m.p.	melting point
MPN	most probable number
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sp., spp.	species
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summ.	summary
Suppl.	Supplement
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temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
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var.	variety
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W.	West, Western, etc.
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Chemical symbols are used for all elements

ABBREVIATIONS FOR LANGUAGES

Language of text

Dutch	Nl
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l	litre
lb	pound
lb	pound-force
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m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
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min	minute [time]
min.	minimum
mol	mole
mol.wt	molecular weight
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TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
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vol.	volume
v/v	volume/volume
w	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to;
	not less than
<	less than
≤	less than or equal to;
	not greater than

Chemical symbols are used for all elements

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a _w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm ² , cm ³]
cal	calorie
cd	candela
Cl	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detrn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD	electron capture detection
EDTA	ethylenediaminetetra acetic acid
ORP	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10 ⁻¹⁵ , as in fCi]
F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FD	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet

g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10 ⁻⁹ , as in nm]
N	Newton [kg m/s ²]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10 ⁻¹² , as in pCi]
P	poise
P	probability
Pa	Pascal [N/m ²]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride

qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West, Western, etc.
WHO	World Health Organization
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A	ampere	g	gram	qt	quart
AAS	atomic absorption Spectrometry	GC	gas chromatography	R	rontgen
abstr.	abstract	gn	gravity	rad	rad or radian
ad lib.	ad libitum	gal	gallon	ref.	reference(s)
ADP	adenosine diphosphate	gf	gram-force	rev/min	revolutions per minute
Anon.	Anonymous	GLC	gas-liquid chromatography	RH	relative humidity
AOAC	Association of Official Analytical Chemists	h	hour	RNA	ribonucleic acid(s)
approx.	approximately	ha	hectare	S.	south, Southern, etc.
atm	atmosphere	HDPE	high density polyethylene	s.d.	standard deviation
ATP	adenosine triphosphate	hl	hectolitre [100 l]	SDS	sodium dedecylsulphate
a_w	water activity	hp	horse power	s.e.	standard error
BHA	butylated hydroxyanisole	HPLC	high performance/pressure liquid chromatography	s	second [time]
BHT	butylated hydroxytoluene	HTST	high temperature short time	SNF	solids-not-fat
BOD	biological oxygen demand	Hz	hertz [frequency cycle/s]	sp., spp.	species
b.p.	boiling point	in	inch	sp.gr.	specific gravity
Btu	British thermal unit	IR	infrared	summ.	summary
c-	centi- [as in cm, cm ² , cm ³]	IU	international unit	Suppl.	Supplement
cal	calorie	J	joule	t	metric tonne
cd	candela	k-	kilo- [as in kcal, kg]	temp.	temperature
Ci	curie	K	Kelvin	TLC	thin layer chromatography
CMC	carboxymethyl cellulose	l	litre	TS	total solids
COD	chemical oxygen demand	lb	pound	UHT	ultra-high temperature
coeff.	coefficient	lb	pound-force	UV	ultraviolet
conc.	concentrated	LDPE	low density polyethylene	V	volt
concn.	concentration	m-	milli- [as in mg, ml, mm]	var.	variety
cv.	cultivar	m-equiv	milli-equivalent	vol.	volume
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d-	deci-	M-	mega- [as in Mrad]	w	watt
DE	dextrose equivalent	max.	maximum	W.	West, Western, etc.
detn.	determination	min	minute [time]	WHO	World Health Organization
DFD	dark firm dry	min.	minimum	w/v	weight/volume
diam.	diameter	mol	mole	wk	week
dil.	dilute	mol.wt	molecular weight	wt.	weight
DM	dry matter, Deutsche Mark	m.p.	melting point	yd	yard
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dyn	dyne	MS	mass-spectrometry	μ	micro- [as in g, m]
E.	East, Eastern, etc	n-	nano- [10 ⁻⁹ , as in nm]	%:	per centum
ECD.	electron capture detection	N	Newton [kg m/s ²]	>	greater than
EDTA	ethylenediaminetetra acetic acid	N.	North, Northern, normal concentration	>=	greater than or equal to;
Eh	oxidation-reduction potential	NMR	nuclear magnetic resonance	<	less than
ELISA	enzyme-linked immunosorbent assay	NPU	net protein utilization	<=	less than or equal to;
f-	femto- [10 ⁻¹⁵ , as in fCi]	oz	ounce		not greater than
°F	degree Fahrenheit	p-	pico- [10 ⁻¹² , as in pCi]	Chemical symbols are used for all elements	
FAO	Food and Agricultural Organization	P	poise	ABBREVIATIONS FOR LANGUAGE	
FDA	Food and Drug Administration	P	probability	Language of text	
FID	flame ionization detection	Pa	Pascal [N/m ²]	Dutch	Nl
fl oz	fluid ounce	PAGE	polyacrylamide gel electrophoresis	French	Fr
f.p.	freezing point	PER	protein efficiency ratio	German	De
ft	foot, feet	p.p.b.	parts per billion	Italian	It
		p.p.m.	parts per million	Japanese	Ja
		PSE	pale soft exudative	Norwegian	No
		PTFE	polytetrafluorethylene	spanish	Es
		PVC	polyvinyl chloride	swedish	Sv
		PVDC	polyvinylidene chloride		

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	not less than
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≤	less than or equal to;
	not greater than

Chemical symbols are used for all elements.

ABBREVIATIONS FOR LANGUAGE

Language of text

Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
spanish	Es
swedish	Sv

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ABBREVIATIONS

A	ampere
AAS	atomic absorption Spectrometry
abstr.	abstract
ad lib.	ad libitum
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a _w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm ² , cm ³]
cal	calorie
cd	candela
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetra acetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10 ⁻¹⁵ , as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet

g	gram
GC	gas chromatography
gn	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycle/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lb	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
m	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt	.molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10 ⁻⁹ , as in nm]
N	Newton [kg m/s ²]
N.	North, Northern, normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10 ⁻¹² , as in pCi]
P	poise
P	probability
Pa	Pascal [N/m ²]
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride

qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	south, Southern, etc.
s.d.	standard deviation
SDS	sodium dedecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp.,spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
w	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, m]
%:	per centum
>	greater than
≥	greater than or equal to;
	not less than
<	less than
≤	less than or equal to;
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249

Kumbhar (BK) and Singh (BPN). **Ways to increase profit margin or reduce product cost in a food industry.** *Indian Food Packer* 45(5): 1991: 19-28

The cost of processed products depend on raw material, harvesting method, packaging and transport system, grading, storage and ripening, processing and marketing. The profit margin could be increased if the cost of the raw material and processing costs are reduced. This paper suggests ways and means to increase productivity and reduce post-harvest loss and processing cost by efficient and judicious use of utilities like water, steam and electricity, refrigeration, capacity utilization and working condition in the plant. VKR

250

Nesvadba (P). **Increased supercooling in irradiated foods.** *International Journal of Food Science and Technology* 26(2): 1991: 165-171

The supercooling temp. of water-containing irradiated and non-irradiated foods vary within samples and statistically defined distributions are required to describe them. The distributions for irradiated and non-irradiated samples overlap. However, three out of four irradiated samples of different high water content foods show significantly lower mean supercooling temp. The supercooling temp. also change with storage time. It is possible that these observations could form the basis for a practical detection method for irradiated foods although much more work is required before clear conclusions can be drawn. Possible approaches are discussed. AS

251

Anon. **Fried foods stabilizer keeps moisture in and fat out.** *Prepared Foods* 160(3): 1991: 61

Research has proved that a cellulose food gum, hydroxypropyl methylcellulose can significantly lower the amount of oil absorbed by battered/breaded food during frying. GS

FOOD PROCESSING

252

Shimada (A), Kasai (M), Yamamoto (A) and Hatae (K). **Changes in the palatability of foods by**

Eleven kinds of foods (rice, soybean, sweet potato, Japanese radish, carrot, apple, pear, persimmon, beef and chicken) were pressurized at hydrostatic pressure of 5000 kg/cm² at room temp. for 10 min. Effect of pressurizing on appearance, odour, taste and texture of food was evaluated by sensory tests. Changes in hardness and colour were measured by a Texturometer and a Colour difference meter, resp. The fracture load and fracture deformation of Japanese radish were also measured by a Rheoner. The surface structures before and after pressurizing were observed by SEM. Furthermore, after pressurizing, the permeation rate of NaCl into Japanese radish during NaCl aqueous solution soaking and the browning rate of potato were studied. The appearance, odour, taste and texture of almost all foods changed by pressurizing except rice and soybean. The texture of potato and sweet potato turned to pliable and the sweetness of sweet potato increased. Taproot vegetables increased in transparency and became pliable. The transparency and sweetness of the fruits increased. Gelatinization in potato starch was not observed. Pressurized Japanese radish absorbed more NaCl than controlled one. The browning rate of potato was accelerated by pressurizing. From these results, it is suggested that hydrostatic pressure will become one of the useful way for new food processing or cooking. AS

FOOD PACKAGING

253

Kozyrod (RP) and Ziazaris (J). **A survey of plasticizer migration into foods.** *Journal of Food Protection* 52(8): 1989: 578-580

A survey of 184 samples of food packaged in a range of plastics was carried out to assess the incidence of plasticizer migration into foods. Food samples were screened for the plasticizers di-(2-ethylhexyl) adipate (DEHA), di-(2-ethylhexyl) phthalate (DEHP), and diisooctyl phthalate (DIOP) using GC. Only samples in contact with polyvinyl chloride (PVC) films were found to contain a detectable amount of DEHA. Of the 98 samples wrapped in PVC films, 44 (45%) showed levels of migration exceeding 30 mg/kg. In particular, significant quantities of DEHA were observed in cheeses which had been wrapped at the point of sale. DEHA was detected in 36 out of 38 samples (95%) of cheese wrapped in PVC film, with levels ranging from 31 to 429 mg/kg. Fresh meats packaged in PVC film gave positive results in 5 of the 42 samples analyzed (12%), with

levels ranging from 49 to 151 mg/kg. Migration of DEHA into other foods such as sandwiches was also observed, while some food types, such as frozen chicken, showed no detectable migration. AS

FOOD ENGINEERING AND EQUIPMENT

254

Kolbe (E) and Schnekenburger (R). **Temperature monitor for freezers and cold stores.** *International Journal of Refrigeration* 14(2); 1991: 117-119

A system has been developed to enable the measurement of important product temp. It consists of a commercial datalogger in a housing designed to protect it from freezer environment. The system is inexpensive, easy to assemble, portable, durable and easy to use; capable of recording and storing data at different rates throughout the given freezing or storage study; capable of supporting different sensors to enable a range of future applications; and capable of quick and straightforward data retrieval and processing. BV

255

Potschke (L), Handreck (B) and Maier (W). **Process engineering in a roller mill.** *Getreide-Mehl und Brot* 45(5); 1991: 135-140 (De)

ENERGY IN FOOD PROCESSING

256

Bekbolet (M). **Light effects on food.** *Journal of Food Protection* 53(5); 1990: 430-440

A review article highlighting current research studies carried out on light-induced changes in dairy products, fats and oils and meat products. In dairy products, riboflavin degradation, losses of vitamin A and C are the major effects, whereas in fats and oils the effective constituents are β -carotene, tocopherols, the undesirable flavours being related mainly to photosensitized oxidation. In case of meat products, the visual appearance seems to be the most important effect due to the formation of oxidised pigment metmyoglobin from oxy-myoglobin upon light exposure. The effects of packaging materials and types on photooxidation are also being discussed for each of the above three food commodity groups. BV

FOOD CHEMISTRY AND ANALYSIS

257

Thakur (BR) and Arya (SS). **Role of sorbic acid in non-enzymatic browning reactions in liquid and solid model food systems.** *International Journal of Food Science and Technology* 26(2); 1991: 157-164

Role of sorbic acid (SA) in browning development in model systems has been studied. In liquid model systems containing water-glycerol-glucose (WGG), water-glycerol-sucrose (WGS), 45% sucrose and 30% sucrose plus 15% glucose, SA degraded when stored at 37 C forming brown pigments. Addition of amino acids (glycine or lysine monohydrochloride) increased the rate of browning development while Cu^{2+} reduced SA degradation and browning development. In the absence of amino acids and SA, WGG and WGS systems did not brown appreciably. In solid systems with SA adsorbed on microcrystalline cellulose, the max. rate of browning occurred at 0.73 a w, but max. rate of SA loss was at 1.0 a w. In all systems inclusion of amino acids reduced SA degradation but increased browning development. The rate of SA-induced browning was considerably higher than that caused by sugar-amino acid interactions. AS

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

258

Notermans (S), Soentoro (PSS) and Delfgou-Van Asch (EHM). **Survival of pathogenic microorganisms in an egg-nog-like product containing 7% ethanol.** *International Journal of Food Microbiology* 10(3/4); 1990: 209-218

A liquor consisting of whole egg, saccharose (25% w/v) and ethanol (7.0% w/v) was artificially contaminated with *Salmonella enteritidis*, *S. typhimurium*, *Staphylococcus aureus* (three different strains), *Bacillus cereus* and *Listeria monocytogenes*. After 3 wks of incubation at 22 C the numbers of *Salmonella*, *S. aureus* and *L. monocytogenes* decreased more than 3 log₁₀ units. Under such conditions, however, the total number of microorganisms increased 3 log₁₀ units. At 4 C the decrease of pathogenic microorganisms was much slower and a decrease of 3 log₁₀ units was observed only after 7 wks of incubation. Egg-nog, without ethanol, incubated at 22 C allowed growth of *Salmonella* and *S. aureus*, while the numbers of *B. cereus* spores remained unchanged. Vegetative cells of *B. cereus* as well as *L. monocytogenes* decreased in numbers. However, after prolonged incubation the numbers of *L. monocytogenes* increased significantly. AS

Listeria monocytogenes

259

Buchanan (RL) and Phillips (JG). **Response surface model for predicting the effects of temperature, pH, sodium chloride content, sodium nitrite concentration and atmosphere on the growth of *Listeria monocytogenes*.** *Journal of Food Protection* 53(5); 1990; 370-376

A factorial plus supplemental central composite experimental design was used to assess quantitatively the effects and interactions of temp. (5 - 37 C), pH (4.5 - 7.5), NaCl (5 - 45 g/l), NaNO₂ (0 - 1000 µg/ml), and atm. (aerobic vs. anaerobic) on the growth kinetics of *Listeria monocytogenes* Scott A in Tryptose Phosphate Broth. A total of 709 growth curves were generated, with individual curves fitted using non-linear regression analysis in conjunction with the Gompertz function. The results were analyzed by response surface analysis to generate a cubic model to predict the growth of *L. monocytogenes* in response to any combination of the variables within the specified ranges. Evaluation of the model indicated that it can be used to provide reasonable "first estimates" of the impact of food formulation and storage conditions on the growth of *L. monocytogenes*, and can be automated readily to develop "user-friendly" software. AS

260

Palumbo (SA) and Williams (AC). **Effect of temperature, relative humidity suspending menstrua on the resistance of *Listeria monocytogenes* to drying.** *Journal of Food Protection* 53(5); 1990; 377-381

Studies on the ability of *Listeria monocytogenes* to survive dehydrated storage at different temp. (5 vs. 25 C) and rh (75, 59, 35, 14 and 1%) when suspended in different menstrua revealed that *L. monocytogenes* survived longer when held at 5 C as compared to 25 C, when suspended in beef extract, glycerol, karo syrup, skim milk and canned milk as compared to distilled water. Survival of *L. monocytogenes* tended to be longer at the lower rh. There was less than a 2 log₁₀ decline in the viable population (starting count ca. 10⁵/coverslip) of *L. monocytogenes* when suspended in beef extract and held at 5 C and rh of 59% and below. This organism was not injured during drying storage at the various rh tested. The selective enumeration media permitted quantitative recovery of the organism dried on surfaces. The findings suggest that *L. monocytogenes* occurring as a contaminant in a food

processing plant can persist for long periods in the plant environment, if the temp. is low and the organism is protected by food components. BV

261

Tiwari (NP) and Aldenrath (SG). **Isolation of *Listeria monocytogenes* from food products on four selective plating media.** *Journal of Food Protection* 53(5); 1990; 382-385

The suitability of four selective media - modified McBride Agar, Acriflavine-Ceftazidime Agar, Lithium chloride-phenylethanol-Moxalactane Agar (LPM), and Oxford Agar (OA) for isolation of *Listeria monocytogenes* 4b (81-861), 3a (7834) and 286 has been evaluated. Samples of cheese, processed meat, fresh vegetables and raw milk were inoculated with low numbers of *L. monocytogenes* cells. Inoculated samples were superior and gave higher recovery with all strains studied. Incubation of enrichment broth culture for 2 days was necessary to achieve a satisfactory level of performance. BV

262

Farrag (SA) and Marth (EH). **Behaviour of *Listeria monocytogenes* when incubated together with *Pseudomonas* species in tryptose broth at 7 and 13 C.** *Journal of Food Protection* 52(8); 1989; 536-539

Tryptose broth (TB) was inoculated with *Listeria monocytogenes* (strain Scott A or California), *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*, or a combination of *L. monocytogenes* plus *Pseudomonas* species, and incubated at 7 or 13 C for 8 wks. McBride Listeria Agar was used to determine numbers of *L. monocytogenes* and *Pseudomonas* Isolation Agar to enumerate *Pseudomonas* species at 0, 7, 14, 28, 42 or 56 days. At 13 C, presence of *P. fluorescens* had a slight negative effect on growth of *L. monocytogenes* strain Scott A, and was somewhat detrimental to its survival during the extended incubation. Growth of *L. monocytogenes* strain California was retarded by presence of *P. fluorescens* although the max. population achieved by the pathogen was greater in the presence rather than absence of the pseudomonad; the pseudomonad did have a negative effect on survival of the pathogen. At the same temp., *P. aeruginosa* had a negative effect on survival of *L. monocytogenes* strain California, but had essentially no effect on the other strain of the pathogen. Neither strain of *L. monocytogenes* affected growth of *P. fluorescens* nor *P. aeruginosa*. At 13 C the pH of TB generally decreased when *L. monocytogenes* grew by itself but increased when either pseudomonad grew by itself or together with the pathogen. At 7 C, growth of both pseudomonads was minimal. Presence of non-growing cells of *P.*

fluorescens retarded somewhat growth of both *L. monocytogenes* strains early during the incubation. *P. aeruginosa* had no detectable effect on either strain of *L. monocytogenes*. The pH of TB decreased when *L. monocytogenes* grew by itself or together with either pseudomonad, and remained unchanged in TB inoculated with either pseudomonad. AS

263

Sorrells (KM), Enigl (DC) and Hatfield (JR). **Effect of pH, acidulant, time and temperature on the growth and survival of *Listeria monocytogenes*.** *Journal of Food Protection* 52(8); 1989; 571-573

The effect of different acids, pH, incubation time and incubation temp. on the growth and survival of four strains of *Listeria monocytogenes* in tryptic soy broth was compared. Hydrochloric acid (HCl), acetic acid (AA), lactic acid (LA), malic acid (MA), and citric acid (CA) were used to acidify tryptic soy broth to pH values 4.4, 4.6, 4.8, 5.0 and 5.2 pH. Incubation times were 1, 3, 7, 14 and 28 days at 10, 25 and 35 C. The inhibition of *L. monocytogenes* in the presence of high acidity appears to be a function of acid and incubation temp. Based on equal pH values, the antimicrobial activity is AA > LA > CA greater than or equal to MA > HCl at all incubation times and temp. When based on equal molar concn., the activity appeared to be CA greater than or equal to MA > LA greater than or equal to AA > HCl at 35 and 25 C, and MA > CA > AA greater than or equal to LA > HCl at 10 C. Greatest antimicrobial activity occurred at 35 C. Greatest survival occurred at 10 C and greatest growth occurred at 25 C. Final pH of the medium was as low as 3.8 in HCl at 28 days. All strains grew well at pH values lower than the min. previously reported (5.5 - 5.6). AS

Pseudomonas aeruginosa

264

Burke (RM), Upton (ME) and McLoughlin (AJ). **Influence of pigment production on resistance to ultraviolet irradiation in *Pseudomonas aeruginosa* ATCC 10145.** *Irish Journal of Food Science and Technology* 14(1); 1990; 51-60

Pseudomonas fluorescens

265

Fortina (MG), Pagliarini (E) and Manachini (PL). **Heat resistant protease from *Pseudomonas fluorescens* MFP 1.** *Italian Journal of Food Science* 1(3); 1989; 63-70

The production of heat resistant proteases by psychrotrophic microorganisms isolated from raw milk and the resistance of such proteases to

ultra-high temp. were studied. Proteases produced by *P. fluorescens* strain MFP 1, chosen as the model, was influenced by nitrogen source and inoculum size. The secretion of protease occurred at both 4 and 22 C and decreased markedly at 30 C. The protease MFP 1 showed max. activity against casein substrate at pH 7.5 and 45 C. It was inactivated in milk on heating at 55 or 60 C for 30 min, but was resistant to heat treatment at 110 to 135 C. At 135 C, the protease D value was about 8 times greater than the D value of *Bacillus stearothermophilus* spores. AS

Staphylococcus

266

Kamat (MY), Sulebele (G) and Nirupama Sabnis. **A comparative evaluation of media for enumeration of enterotoxigenic staphylococci by selective enrichment technique.** *Journal of Food Science and Technology (India)* 28(6); 1991; 381-383

Two enrichment media namely, Giolitti Cantoni's Tellurite broth (TEB) and Raj's Mannitol Salt Sorbic Acid (MSSA) broth were compared from selective isolation of enterotoxigenic Staphylococci from food samples. With the limited number of samples screened, the present findings indicate that Raj's MSSA medium has a distinct advantage for dairy products over TEB medium. AS

Staphylococcus aureus

267

Khalil (H) and Villota (R). **The effect of microwave sublethal heating on the ribonucleic acids of *Staphylococcus aureus*.** *Journal of Food Protection* 52(8); 1989; 544-548

The effect of microwave sublethal heat injury on the integrity of *S. aureus* FRI-100 RNA was examined. The extent of damage to RNA during sublethal microwave heat injury was greater than that occurring as a result of conventional sublethal heating. Although both heating modes resulted in the destruction of the 16S RNA, only those cells heated with microwave energy suffered lesions in their 23S RNA. When cells were allowed to recover, the conventionally heated cells regained normal profiles of the 16S and the 23S RNA after 180 min on the recovery medium. Microwave heated cells restored their 16S RNA after 180 min of recovery. Microwave-injured cells required 270 min to have 23S RNA with sedimentation properties similar to those found in the unheated cells. AS

Fungi

Aspergillus parasiticus

268

Karapinar (M). **Inhibitory effects of anethole and eugenol on the growth and toxin production of *Aspergillus parasiticus***. *International Journal of Food Microbiology* 10(3/4); 1990; 193-200

Anethole, up to concn. of 400 µg/ml delayed growth and reduced mycelial wt. was observed, but it showed a stimulative effect on the toxin production of both strains. At a concn. of 300 µg/ml, eugenol inhibited the growth of two strains; level of eugenol below 200 µg/ml enhanced production of aflatoxin particularly by *Aspergillus parasiticus* NRRL 299. BV

Mushrooms

269

Okereke (A), Beelman (RB), Huhtanen (CN) and Miller (AJ). **Acid-blanching and EDTA reduce spoilage and toxigenesis of canned mushroom inoculated with proteolytic *Clostridium botulinum* types A and B spores**. *Journal of Food Protection* 53(5); 1990; 425-427

A new process involving acid-blanching and addition of EDTA to the canning brine (ABC) was compared with the standard commercial method (SCM) for the control of *C. botulinum* spores in canned mushrooms. Fresh mushrooms were uniformly inoculated under vacuum with 10^5 spores of proteolytic strains of *C. botulinum* types A and B and processed either by ABC or SCM method. Compared to SCM the ABC process significantly reduced the spoilage and toxigenesis of canned products. At F_0 values of 0.5, 2 and 4, the ABC when compared to the SCM process reduced percent spoilage from 91.4 to 51.5, 17.6 to 6.3 and 12.1 to 2.9 resp. No botulinal toxicity occurred except at F_0 of 0.5 when the number of toxic cans was reduced from 54.3 to 30.3 by the ABC, compared to SCM. AS

BIOTECHNOLOGY

270

Bajaj (VK), Rai (T) and Kanawjia (SK). **Biotechnological applications for analysis of food and food additives**. *Indian Dairyman* 43(11); 1991; 505-513

Biotechnological methods in food analysis, microbiological methods, cell and tissue culture

methods, immuno-chemical methods, and the use of enzyme as analytical tools like enzyme electrodes/sensors and indicator enzymes are the aspects covered. SRA

271

Gharpure (YH). **Biotechnology - emerging technologies**. *Chemical Age of India* 41(2); 1990; 77-81

Historical background, present state of art, enzyme production, fermentation products, fermentation facilities, computerisation of fermentation, genetic engineering (protein engineering), major applications (agriculture, food additives) and future are the aspects highlighted in this article. SRA

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antioxidants

272

Nakatani (N). **Recent advances in the study on natural antioxidants**. *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7); 1990; 569-576

Colourants

Dyes

273

Sudhir Singh and Khanna (SK). **Toxicological evaluation of permitted food colours. Part IV. Indigoid dye (blue)**. *Indian Dairyman* 43(11); 1991; 501-504

Article reviews short and long term studies conducted on toxicological evaluation of indigo carmine (C.I. food blue 1) as food colouring agent in pigs, female beagle dogs, male and female mice, and on human volunteers. The study covers teratogenic, mutagenic and carcinogenic effects. SRA

274

Aparnathi (KD) and Sharma (RS). **Analytical aspects of annato colour for food.** *Indian Food Packer* 45(4): 1991: 42-48

Analytical aspects of annato (*Bixa orellana* L) colour have been reviewed including extraction, resolution techniques, detection and detn. methodologies. VKR

Tartrazine

275

Sudhir Singh. **Technological aspects of tartrazine: An overall perspective.** *Indian Dairyman* 43(10): 1991: 473-476

This article briefly presents information on the characteristics, principles involved in manufacture, per capita consumption, and the metabolite fate of tartrazine in the system. SRA

Xanthene

276

Sudhir Singh, Khanna (SK) and Mathur (BN). **Toxicological evaluation of permitted food colours. Part III. Xanthene dye (red).** *Indian Dairyman* 43(10): 1991: 465-469

A review of the toxicological work carried out to assess the safety of red xanthene dye (erythrosine). The work carried out so far on short term studies indicated that no harmful effect of erythrosine at 0.02% was observed in rats, dogs, gerbils and pigs. Long term studies conclusively showed that no adverse effect was observed in mortality, haematology gross pathology, and histopathology to mice rats, gerbils and dogs at a max. limit of 0.02% in the food products. However, hepatic cirrhosis was observed in female rats exposed at 4% or more levels of erythrosine for periods upto 18 months. Erythrosine inhibited various digestive enzymes. Carcinogenicity with oral and subcutaneous administration, studies conducted with protein bound iodine and also the allergic action of erythrosine have been mentioned. The inhibitory action of erythrosine on enzyme systems has also been indicated. SRA

Flavourings

277

Pons (J). **Analysis of aromatic caramel.** *Food Chemistry* 39(3): 1991: 311-320

A new device is presented in this paper using a continuous trapping on adsorbent when heating, followed by a thermal desorption and overall analysis. 57 compounds were detected by this technique and also by solvent extraction and vapour analysis during cooking. Some unexpected intermediate volatile molecules were noted which can play an important role in the formation of the flavouring compounds. BV

CEREALS

278

He (H) and Hosney (RC). **Gas retention of different cereal flours.** *Cereal Chemistry* 68(4): 1991: 334-336

Wheat, rye, rice and corn flours were compared for their bread-baking properties. Only wheat flour formed a viscoelastic dough and produced a light-textured loaf. Differences in gassing power among the four cereal flours were not sufficient to explain the differences in loaf volume. Measurement of CO₂ released from doughs using an electric resistance oven showed that over the periods of fermentation, proofing, and baking, wheat flour dough retained gas until heated to 72 C during baking, whereas the other doughs started releasing gas during fermentation or proofing. The flours released gas as follows, in decreasing order: corn, rice, rye, wheat. Loaf volume was in the reverse order, indicating that the gas retention ability of dough mainly determined the loaf volume of these cereal flours. AS

Buckwheat

279

Tsuzuki (W), Ogata (Y), Akasaka (K), Shibata (S) and Suzuki (T). **Fatty acid composition of selected buckwheat species by fluorometric high-performance liquid chromatography.** *Cereal Chemistry* 68(4): 1991: 365-369

The fatty acid composition of buckwheat seeds, including the tartary species, was analyzed by HPLC using 9-bromomethylacridine (9-Br-Ma) as a fluorescent labeling reagent for the carboxyl group. In a comparison with the common species, tartary was characterized in relation to the amount of C18:3 fatty acids and those with 20 or more carbons. The values obtained by combining fluorometry and HPLC were compared with those obtained by GC.

The values of both methods were in good agreement, although slight differences were found in the C16:0 and C24:0 fatty acid contents. These results suggest that the combination of fluorometry and HPLC is a highly sensitive, simple procedure for determining the fatty acid composition of buckwheat seeds. AS

280

Ikeda (K), Sakaguchi (T), Kusano (T) and Yasumoto (K). **Endogenous factors affecting protein digestibility in buckwheat.** *Cereal Chemistry* 68(4): 1991; 424-427

Endogenous factors affecting protein digestibility of buckwheat were studied. High levels of protease inhibitor and tannin, which are inhibitory factors of protein digestibility, were found in various buckwheat products. A significant difference in susceptibility to proteolytic action among buckwheat protein components was noted, with the globulins being more digestible by proteases than the albumins. These findings indicate that the protein digestibility of buckwheat is defined by two factors: the inhibitory potency of endogenous antinutrients, such as protease inhibitor and tannin, and the susceptibility of protein per se to proteolytic action. AS

Oats

281

Yiu (SH), Weisz (J) and Wood (PJ). **Comparison of the effects of microwave and conventional cooking on starch and β -glucan in rolled oats.** *Cereal Chemistry* 68(4): 1991; 372-375

Rollled-oat porridge was prepared by conventional and microwave cooking to determine and compare the effects of these cooking methods on the texture, viscosity and amounts of dispersed gelatinized starch and solubilized (1-3)(1-4)- β -D-glucan (β -glucan). The porridge prepared by microwave cooking was generally more grainy and less viscous than that prepared by the conventional method. Microwave cooking produced relatively less dispersed gelatinized starch and less solubilized β -glucan than did conventional cooking. The difference was slight with short cooking duration (1 min) but increased drastically with prolonged cooking (20 min). Thicker oat flakes (regular-cooking rolled oats) released less solubilized β -glucan and gelatinized starch than did thinner oat flakes (quick-cooking rolled oats) upon cooking. Microscopic examination revealed that the two cooking methods had different effects on the structural organization of oats. Rolled oats prepared by microwave cooking contained starch granules that were smaller in vol. and less

convoluted in structure than those conventionally cooked. Furthermore, the cell wall of the former was less disrupted. These differences may have been due to the effect of stirring; the microwave-heated rolled oats were stirred relatively less than were the conventionally cooked samples. AS

Paddy

282

Kulkarni (SD) and Bal (S). **Kinetics of liquid water absorption by evacuated paddy grains.** *Journal of Food Science and Technology (India)* 28(6): 1991; 341-344

An empirical equation correlating moisture content to duration of soaking in water at 30 - 80 C was developed for evacuated paddy. The equation was based on generalised mathematical equation developed for direct soaking of paddy. The predicted and experimental values of moisture content were non-significant for entire range of this study at 0.5% level of significance. The developed equation therefore can be directly used for prediction of moisture content of paddy soaked in water, after evacuation, in the temp. range of 30 - 70 C for soaking duration upto 6 h and 2 h for 80 C. AS

283

Donahaye (E), Navarro (S), Ziv (A), Blauschild (Y) and Weerasinghe (D). **Storage of paddy in hermetically sealed plastic liners in Sri Lanka.** *Tropical Science* 31(2): 1991; 109-121

A trial was carried out in Sri Lanka on the outdoor storage for 6 months of locally grown paddy (type Nadu) in two hermetically sealed flexible liners termed 'storage cubes'. Insect infestations failed to develop in both cubes and TGM evaluations indicated a 0.33 - 0.64% loss in dry wt. due to metabolic activity. In one of the cubes, which contained paddy at higher moisture contents, a moisture condensation effect was revealed on the under-side of the upper liner. Losses by mould development resulting from this effect were estimated at 1.24%. Means for obviating this occurrence are proposed. AS

284

Mastan Pasha (M), Anu Appaiah and Karanth (NGK). **Efficacy of thiram as a seed dressing fungicide and its effect on seedling vigour of paddy.** *Tropical Science* 31(2): 1991; 123-130

Paddy seed treatment with 0.2% thiram prevented fungal infection during storage for 150 days. Initial degradation of the fungicide was rapid and more than 50% disappeared in 2 wks. Thereafter,

breakdown was slow, with the result that 200 p.p.m. was recovered after 5 months. Efficacy of the fungitoxicant varied depending on the fungus and the procedure of evaluation. Thiram treatment as a dusting or slurry was superior to the steeping method. The former two preserved germination and seedling vigour. AS

Rice

285

Verma (RA) and Uttam (JR). **Studies on the susceptibility of rice varieties to *Sitotroga cerealella* Oliv.** *Bulletin of Grain Technology* 28(1): 1990; 22-24

The relative resistance of 16 var. of rice was tested against *S. cerealella* Oliv. in the lab. by assessing the damaged grain %, loss in grain wt. and mean adult population/500 grains over a storage period of 80 days at 27 plus or minus 2 C in 1985. The seeds of Usar 1, Ashwini, Jaya and I.R. 8 were least susceptible to the pest while CR 237-1, Basmati 370, T₂₃, T₃ and Prasad were most susceptible. The seeds of other rice var. were moderately susceptible to the insect. Seeds of none of the rice var. tested were resistant to *S. cerealella* Oliv. KAR

286

Roy (MK), Ghosh (SK) and Chatterjee (SR). **Gamma-irradiation of rice grains.** *Journal of Food Science and Technology (India)* 28(6): 1991; 337-340

Rice grains of the var., 'Pusa-33', at 12.0% moisture, were irradiated with doses of 0 - 150 kGy. The crystallinity of starch, soluble amylose and yellowness of treated grains increased with increment in the dose of radiation but water adsorption and vol. expansion on cooking decreased. Irradiation at doses of 3 - 5 kGy increased imperceptibly the hardening of rice cooled after cooking, but had no effect on edibility. The off-aroma in irradiated grains was perceptible at doses higher than 5 kGy. The changes in colour and aroma persisted also on cooking. Upto a dose of 5 kGy, the sensory scores of rice, both cooked and uncooked, were at or above acceptable limit of score (5.5). The doses of 3 and 5 kGy were highly effective in reducing fungal population in irradiated grains, but in view of the changes in colour and cooking qualities, 3 kGy is the preferred dose-limit of irradiation. AS

287

Amarjeet Kaur, Sekhon (KS) and Nagi (HPS). **Parboiling of rice: Effect on physicochemical, milling and cooking properties.** *Journal of Food Science and Technology (India)* 28(6): 1991; 384-385

Parboiling treatments of paddy var. HM-95, Jaya, Basmati-370, PR-103, PR-106 and PR-107 improved head rice recoveries and pressure parboiling (steaming for 20 min at 15 lb/square in. pressure) proved to be more beneficial in increasing the head rice yield and reducing the free fatty acid content. Varieties and treatments had a significant effect on mean length/breadth ratio of milled rice kernels. Parboiling brought about increase in amylose content as compared to control. Traditionally parboiled rice required less time for cooking than pressure parboiled rice. Parboiling treatment increased elongation ratio and reduced the losses of solids and gruel upon cooking. AS

288

Zaman (MA) and Bala (BK). **Thin layer solar drying of rough rice.** *Solar Energy* 42(2): 1989; 167-171

This paper presents a set of simple empirical equations for natural air flow solar drying of rough rice mixed-mode type dryer, box-type dryer and open floor drying system. The moisture contents predicted by the equations were in good agreement with the observed values. The effect of drying air temp. on the drying rate constants for these cases were found to be insignificant. The equilibrium moisture content appeared to be the most important variable controlling the drying rate. The highest drying rate was observed in case of mixed-mode dryer. The drying rate of box dryer was next to that of mixed-mode dryer. This study shows that the introduction of solar dryer for drying of rough rice is highly recommendable in Bangladesh. AS

289

Firmin (A). **Quality characteristics of fifteen rice varieties grown in the Ivory coast.** *Food Chemistry* 39(3): 1991; 357-362

Fifteen var. of rice grown in the Ivory coast were evaluated for chem. and physical characteristics. The protein contents of these var. ranged from 6.10% to 8.57% and that of carbohydrate from 67.7% to 75.5%. Moisture and ash levels varied from 9.0 to 12.5% and 0.56% to 1.80% resp. all var. had long and slender grains. Yields of whole-kernel varied widely depending on var., grain type and milling conditions. BV

290

Villareal (CP), Maranville (JW) and Juliano (BO). **Nutrient content and retention during milling of brown rices from the International Rice Research Institute.** *Cereal Chemistry* 68(4): 1991; 437-439

The nutrient content and retention during milling of brown rice was determined by energy-dispersive X-ray fluorescence spectrometry of elements on seven International Rice Research Institute (IR) rices differing in starch properties. With 10% bran-polish removal, milled rice retained 13% thiamine; 46% riboflavin; 33 - 50% crude ash, P, K, Mg, Si and Mn; 54 - 66% Ca, Fe and Zn; and 82 - 90% Kjeldahl nitrogen, Al, S and Cl. Mean Si level in milled rice was 0.015%. Nutrient content and retention during milling of IR brown rices were similar to those of other brown rices. AS

291

Khan (TN) and Reddy (NS). **Quality attributes of four rice varieties.** *International Journal of Food Science and Technology* 26(2): 1991: 153-156

Four var. of rice (*Oryza sativa* L., MAU-Sel-1, MAU-Sel-9, PBM-1 and Ambemohar) were studied for physical and chemical characteristics and cooking, eating, milling and nutritive qualities. A little variation in gel consistency and gelatinization temp., but there were marked differences in water absorption, vol. expansion and percentage of leach loss. Ambemohar var. was less acceptable. Of the 4 var. MAU-Sel-9 was found to be superior to the other three var. of rice for physical, chemical, eating quality and protein content. BV

Wheat

292

Gupta (RB), Bekes (F) and Wrigley (CW). **Prediction of physical dough properties from glutenin subunit composition in bread wheats: Correlation studies.** *Cereal Chemistry* 68(4): 1991: 328-333

The low and high mol. wt. (LMW and HMW) subunit allelic composition of two sets of bread wheat genotypes (48 Australian cvs and 53 genotypes from around the world) were compared according to the quality parameters of their dough as measured by extensigraph. The HMW subunits correlated more strongly ($r = 0.75$, $P < 0.001$) with max. dough resistance (R_{max}) than did the LMW subunits of glutenin ($r = 0.56$, $P < 0.0001$) in the world set. Conversely, the LMW subunits in the Australian wheats correlated more strongly ($r = 0.72$, $P < 0.001$) with R_{max} than did the HMW subunits of glutenin ($r = 0.48$, $P < 0.01$). Dough extensibility (Ext) correlated equally with LMW ($r = 0.44$, $P < 0.001$) or HMW ($r = 0.43$, $P < 0.01$) glutenin subunits in the world set, but in the Australian wheat set, it showed significant correlation only with LMW subunits ($r = 0.54$, $P < 0.001$). However, in both sets of wheat, the highest correlation coeff. between predicted and actual R_{max} and Ext were obtained when

predictions were based on LMW and HMW subunits together. An effective predictive model of dough properties should therefore be based on the composition of both LMW and HMW glutenin subunits. Predictive formulas are presented, based on the wheat sets examined, to estimate R_{max} and Ext; the factors involved for each locus provide a measure of the predictive value of the six glutenin subunit loci. The HMW glutenin subunits loci generally made a bigger contribution to R_{max} values than did the LMW glutenin loci. AS

293

Keagy (PM) and Schatzki (TF). **Effect of image resolution on insect detection in wheat radiographs.** *Cereal Chemistry* 68(4): 1991: 339-343

Wheat kernels were exposed for three days to adults of three insect species (*Sitophilus zeamais* Motschulsky [maize weevil], *Rhyzopertha dominica* (F.) [lesser grain borer], and *Sitotroga cerealella* (Oliv.) [Angoumois grain moth]); the kernels were incubated and X-rayed to produce contact films at 3- to 4-day intervals. The objective was to develop specifications for automated grain-inspection systems and evaluate the effectiveness of current radiographic methods. X-ray images of infested and uninfested kernels were presented to four trained subjects as original films and digitized video images at four magnifications corresponding to 32.8, 65.6, 131.2, and 262.4 μm of film per pixel. Insect detection was a sigmoidal function of insect age. The age required for 50% detection varied linearly with log pixel size (μm of film per pixel). Visual detection from the original films was similar to that from the 65.6 μm /pixel resolution. Ages for equivalent detection increased from the maize weevil to the Angoumois grain moth to the lesser grain borer, reflecting the rate of maturation of the individual species. Development of an automated image-acquisition system equivalent to visual inspection will depend on the availability of an X-ray sensor that is 65 μm or smaller. AS

294

Wu (YV) and Nelsen (TC). **A simple, rapid method to measure wheat hardness by grinding time and speed reduction in a micro hammer-cutter mill.** *Cereal Chemistry* 68(4): 1991: 343-346

Wheat hardness can be simply and quickly measured by determining the time required to collect 17 ml of ground wheat from a 20-g sample in a commercial micro hammer-cutter mill at 3,600 r.p.m. Hard and soft wheats differ in grinding time and in the amount that the machine's speed is

reduced. No correction was necessary for grinding time and speed reduction at moisture levels of 9.3 - 12.7%. AS

295

Thomson (WH) and Pomeranz (Y). **Classification of wheat kernels using three-dimensional image analysis.** *Cereal Chemistry* 68(4): 1991: 357-361

A computer-controlled laser scanning system has been developed to acquire three-dimensional images of the surface of cereal grains. Each picture element represents the elevation of the kernel surface above the reference plane. In addition, a separate image is acquired in which each picture element represents the intensity of the light reflected from the kernel surface. The dual images are then used for feature extraction. The system was used to distinguish between kernels of the wheat cvs Daws (soft white winter) and Tyee (club). A combination of 14 features based on 9 topographic images and 5 intensity images permitted discriminate analysis to correctly classify 92 - 94% of the kernels. The system was also used to identify sprout damage in harvested wheat kernels. A topographical image of the kernel surface helps to distinguish between sprouted and unsprouted kernels. In particular, features that measure the deformation of the germ end of the kernel are crucial to the discrimination process. A discriminant model based on 4 features correctly identified 89% of the sprouted kernels and 83% of the unsprouted kernels when applied to an independent set of test kernels. AS

296

Ercan (R), Erbas (S) and Bildik (E). **Influence of cultivar and location of the thiamin and riboflavin content of bread wheat.** *Getreide-Mehl und Brot* 45(5): 1991: 153-156 (De)

Wheat flour

297

Schnurer (J). **Distribution of fungal biomass among fine bran, coarse bran, and flour from wheat stored at four different moisture levels.** *Cereal Chemistry* 68(4): 1991: 434-437

The fungal content of flour, fine bran, and coarse bran from wheat stored at moisture contents of 12, 16, 20 and 25% was determined as numbers of colony-forming units and as ergosterol levels. The highest values were found when wheat was stored at high moisture contents. In the sound wheat, 97% of the fungal biomass (ergosterol) was found in the bran fraction, which constituted only 31% of the kernel wt. At higher storage moisture, a more even distribution of fungal biomass was found. A weak correlation was found between the number of fungal

propagules and ergosterol content. The high concn. of fungal biomass in the bran indicates that a potential mycotoxin hazard is associated with the use of bran to increase the content of dietary fiber in various foods. AS

298

Mettler (E), Seibel (W), Brummer (J-M) and Pfeilsticker (K). **Experimental studies on the effect of emulsifiers and gums in order to optimize the quality of wheat bread. Part 1: The influence of emulsifiers and gums on the rheological properties of wheat flour doughs.** *Getreide-Mehl und Brot* 45(5): 1991: 145-152 (De)

Wheat starch

299

Zhuge (Q), Persaud (JN), Posner (ES), Deyoe (CW), Seib (PA), Chung (DS). **Isolation of gluten and starch from ground, pearled wheat compared to isolation from flour.** *Cereal Chemistry* 68(4): 1991: 336-339

Wheat (16.4% protein) was pearled to remove 11.4% of bran and germ, and the pearled wheat was ground to an average particle size of 200 μm . The ground, pearled wheat (GPW) was compared with conventionally milled flour (70% extraction) as starting material for wet processing. Using the conventional dough-washing method, GPW gave a gluten yield (based on wheat wt.) 20 - 25% higher than that of flour. The gluten from both GPW and flour contained 75.2 - 76.4% protein (dry matter basis) and were the same Agtron colour. Gluten from GPW was only slightly inferior to an equivalent level of gluten from flour in improving loaf volume in breadmaking. No significant difference was noted in the yield and purity of A-starch from GPW and flour. AS

300

Mok (C) and Dick (JW). **Moisture adsorption of damaged wheat starch.** *Cereal Chemistry* 68(4): 1991: 405-409

The moisture adsorption characteristics of wheat starch damaged by ball milling were studied at 30 C, and the adsorption isotherms were analyzed according to the available models. Damaged starch showed lower and higher sorptive capacities than undamaged starch in the regions of low and high water activity, resp. The Chung-Pfost equation was the best-fitting equation for the adsorption data of undamaged starch. As the degree of starch damage increased, the adsorption isotherms deviated more from the Chung-Pfost equation. The Oswin equation was the best-fitting equation for the adsorption isotherm of damaged starch. AS

Mok (C) and Dick (JW). **Response of starch of different wheat classes to ball milling.** *Cereal Chemistry* 68(4): 1991: 409-412

Starches isolated from the different wheat classes (durum, hard red spring, hard red winter, soft red winter, and white wheats) with min. damage were ball milled for 0 - 24 h. The response of starch to ball milling for the different wheat classes was investigated to see whether the differences in the sensitivity of starch granules to mechanical action among the wheat classes were also responsible for the different degrees of starch damage with respect to wheat hardness. Upon ball milling, the degree of starch damage showed the following trend with respect to wheat type: durum wheats showed a higher degree of damage than hard wheats, which had more damage than soft wheats. This indicates that the starch in hard wheat is susceptible to the physical action of milling and that the strong starch-protein bonds might contribute to a high degree of starch damage after milling. The degree of swelling and the water-solubility index followed the same trends as the degree of starch damage based on wheat type. AS

MILLETS

302

Lal (S), Srivastava (SK), Joshi (BC) and Prajapati (SK). **Studies on aflatoxin contamination in stored jowar and bajra at farm level.** *Bulletin of Grain Technology* 28(1): 1990: 61-65

Samples of jowar stored in traditional storage structures like bag, kuthla and mataka were assessed for aflatoxins contamination. Samples were collected at every alternate month starting from May 1985 (after 5 months of storage) till September 1985 (9 months of storage). Results showed that jowar was much more contaminated than bajra. Contamination was max. in samples collected after 9 months storage as the moisture content was high due to heavy rains. Samples from bag storage were much more contaminated than kuthla. None of the samples from mataka was found to be contaminated with aflatoxin B₁. Out of the contaminated samples only 7.7% contained 40 p.p.b. of aflatoxin which is more than the prescribed limit of 30 p.p.b. KAR

Corn

303

Rajukkannu (K), Lakshmanan (PL), Dorlasamy (P) and Prasad (G). **Aldicarb and carbofuran residues in Deccan maize.** *Madras Agricultural Journal* 77(7-8): 1990: 341-342

The residues of aldicarb and carbofuran were extracted with acetone and transferred to methylene chloride by solvent partitioning. The av. % recovery of aldicarb and carbofuran in maize grain was 91.0 and 94.5 resp. When both carbofuran and aldicarb were applied as basal, residues in grains were not detected at harvest (105 days after treatment). When the same dose (1 kg active ingredient/ha) of carbofuran was applied 15 and 25 days after sowing, the residues in grains were 0.06 and 0.084 p.p.m. resp. GS

304

Macku (C) and Shibamoto (T). **Headspace volatile compounds formed from heated corn oil and corn oil with glycine.** *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1265-1269

The volatile compounds formed in headspace from heated corn oil alone or from corn oil with glycine were collected by a simultaneous purging and solvent extraction apparatus. Aroma components were isolated and identified by GC and GC/MS. Among 123 GC peaks recorded from the samples, 71 compounds were positively identified: 18 aldehydes, 15 heterocyclic compounds, 13 hydrocarbons, 11 ketones, 4 alcohols, 3 esters, and 7 miscellaneous compounds. Total amounts of aldehydes formed in the headspace, particularly unsaturated aldehydes, decreased drastically with the addition of glycine. On the other hand, the number of volatiles formed from corn oil with glycine was significantly greater than from corn oil alone, suggesting that aldehydes formed from corn oil underwent secondary reactions with glycine. AS

Corn flour

305

Minka (S), Laurent (G), Bruneteau (M), Pivot (V) and Michel (G). **Isolation and composition of glycolipids from corn flour.** *Food Chemistry* 39(3): 1991: 329-336

Total lipids extracted according to De Stefanis and Ponte from corn flour (from Cameroon, var. white) amounted to 0.5% of the dry flour wt. The total lipids consisted of 90% neutral lipids, 5% glycolipids and 3% phospholipids. The glycolipids contained glucolipids as major components (4.5%) and minor amounts of a glycerolipidic fraction (0.6%). Glycolipid fatty acids were identified as linoleic, oleic and palmitic acids. AS

Finger millets

306

Vanangamudi (K), Selvaraj (KV) and Kulandaivelu (R). **Influence of irrigation on the seed yield and quality of finger millet.** *Seed Science and Technology* 18(2): 1990: 283-286

In finger millet cv 'CO.12', irrigation was scheduled when the cumulative pan evaporation reached 56, 67 and 83 mm which was equivalent to intervals of 8 - 9, 10 - 11 and 12 - 13 days resp. Irrigating the field when cumulative pan evaporation reached 56 and 67 mm induced early flowering and maturity and resulted in a higher seed yield, improved quality and storability of seeds. The fungal load in storage was also low. By comparison, irrigating when cumulative pan evaporation reached 83 mm reduced the yield (24%), the quality and the storability of the seed which had a heavy fungal load. AS

Pearl millets

307

Khetarpaul (N) and Chauhan (BM). **Effect of pure sequential culture fermentation by yeasts and lactobacilli on HCl-extractability of minerals from pearl millet.** *Food Chemistry* 39(3): 1991: 347-355

Sequential culture fermentation of pearl millet flour first by yeasts (*Saccharomyces diastaticus*, *Saccharomyces cerevisiae*) at 30 C for 72 h and secondly by lactobacilli (*Lactobacillus brevis*; *Lactobacillus fermentum*) at 30 C for 72 h brought about a significant increase in inorganic, HCl-extractable and non-phytate phosphorus with a corresponding decline in phytate phosphorus. The HCl-extractabilities of Ca, Fe, Zn, Cu and Mn from the fermented millet flour were also improved. Higher HCl-extractability of the minerals may be partly ascribed to the decreased content of phytic acid as a significant negative correlation between the phytic acid and HCl-extractability of dietary essential minerals was obtained. AS

Sorghum

308

Hassan Shazali (ME) and Smith (RH). **The growth of single and mixed laboratory populations of three insect pests on stored sorghum.** *Bulletin of Grain Technology* 28(2): 1990: 107-115

The growth of single and mixed populations of *Sitotroga cerealella*, (anugumois grain moth), *Sitophilus oryzae* (rice weevil) and *Tribolium*

castaneum (red flour beetle) were studied at 30 C and 70% RH in the lab. on Sundanese sorghum var. (Um benein 22). In single sp. cultures, the population growth of *S. cerealella* was greater than *Sit. oryzae* and *Tr. castaneum*. The former multiplied exponentially reached a lower max. and then declined sharply. *Tr. castaneum* failed to build comparable populations. In mixed sp. culture, *S. cerealella* eliminated *Sit. oryzae*, whose reproductive capacity was so much reduced that it was unable to reproduce progeny to maintain a significant level of interference; *S. cerealella* was eliminated by *Tr. castaneum* which besides reducing the moth numbers, due to its predatory habits was able to multiply to such an extent as a result *S. cerealella* became extinct. KAR

309

Agrawal (JP), Srivastava (JL), Ashok Kumar and Sone Lal. **Studies on the storability of jowar and bajra in different storage containers.** *Bulletin of Grain Technology* 28(2): 1990: 128-132

Storability of jowar (*Sorghum vulgare*) and bajra (*Pennisetum typholodeum*) and their milled products (atta) was studied in jute bags, polythene bags and tin canisters, under lab. conditions for 7 months. The initial moisture content of 12.8% of whole jowar after 7 months reduced to 13.0, 12.8 and 12.6% in jute bag, polythene bag and in canister resp. while in atta it was 13.2%. The initial moisture content of 12.6% of bajra reduced to 13.7, 12.7 and 12.5% in jute bags, polyethylene bags and canister resp. while in atta it was 13.1%. The tests conducted included alcoholic acidity, free fat acidity, total ash, acid insoluble ash, and sensory quality like taste and flavour. It was inferred that development of rancidity was least in whole jowar and bajra stored in jute bags and max. in those stored in polythene bags. Rancidity development was more in their respective flavours as compared to whole grains, thus whole jowar and bajra may be stored in jute bags for about 7 months under normal conditions. KAR

310

Vangamudi (K), Kulandaivelu (R) and Selvaraj (KV). **Effect of irrigation on seed yield and quality of sorghum.** *Seed Science and Technology* 18(2): 1990: 255-258

An experiment was conducted with sorghum (*Sorghum bicolor* (L.) Monech) cv 'CO.25' to elucidate information on the yield and quality of seeds in relation to irrigation water supplies. Irrigation was scheduled when the cumulative pan evaporation reached 67, 83 and 111 mm equivalent to irrigation frequencies of 10 - 11, 12 - 13 and 14 - 15 days resp. The more frequent irrigations hastened the maturity

of the seed crop and resulted in higher seed yield. Quality and storability were better in the seeds obtained from plots given more frequent irrigation, the seeds were less susceptible to attack by storage fungi. AS

311

Lasekan (OO). A preliminary study of the comparative malting qualities of *Sorghum bicolor* and *Sorghum guineensis*. *Food Chemistry* 39(3): 1991: 241-247

Malting qualities of *Sorghum bicolor* and *Sorghum guineensis* grown in the same field were studied. After the different sorghum grains were steeped in water (10 plus or minus 2 C) with a six-hourly steep liquor change schedule, they were grown on a glass sheet lined with moist blotting paper for a period of 6 days. Germinated seedlings were kilned to a moisture content of 4%. Samples of sorghum (*S. bicolor* and *S. guineensis*) were collected at three different stages (steeping, germination and malt) and subjected to analysis of sugar content, diastatic activity, protein content, viability, apparent extract, water extract and sedimentation rate. *S. bicolor*, which exhibited a significantly ($P < 0.05$) high moisture content when compared with *S. guineensis*, also had a significantly ($P < 0.05$) high protein content, malting loss, enzyme activity and acrospire length. However, no significant ($P < 0.05$) difference was observed when the different sorghums were analysed for sugar and diastatic activity. Variations in sedimentation rates, moisture contents, protein contents, apparent extracts and cold and hot water extracts of the sorghum malts are discussed. AS

312

Westby (A) and Gallat (S). The effect of fermentation on the viscosity of sorghum porridges. *Tropical Science* 31(2): 1991: 131-139

This work was carried out as part of the study to assess the potential of fermented sorghum porridges for use as weaning foods. Changes in viscosity, pH value, total titratable acidity, and microbial numbers during fermentation were measured. Lactic fermentation had no marked effect in reducing porridge viscosity, but did produce a pleasant smelling porridge with a low pH value. Microorganisms other than lactic acid bacteria and yeasts were inhibited. Microbiological thinning of sorghum porridges is attainable, but in this study was only achieved through a *Bacillus* spp fermentation. The resultant porridge had an unpleasant odour. AS

PULSES

313

Chamma (HMCP), Marcos-Filho (J) and Crocomo (OJ). Maturation of seeds of 'aroana' beans (*Phaseolus vulgaris* L.) and its influence on the storage potential. *Seed Science and Technology* 18(2): 1990: 371-382

Seeds of 'Aroana' beans (*Phaseolus vulgaris* L.) were harvested at different periods, ranging from 29 to 63 days after the beginning of flowering. Moisture content, dry matter wt, germination, vigour, seed colour and the contents of total carbohydrates, reducing sugars, protein, soluble N and amino acids were determined. Germination and vigour tests were carried out after the seed had been stored for up to 6 months in order to study the performance of the seeds. It was found that seed dry matter wt. was insufficient by itself to characterise physiological maturity; pod colour may constitute a useful parameter for identifying seed maturity. AS

314

Neumayr (L) and Kramer (J). Production of enterotoxin A thermonuclease by *Staphylococcus aureus* in legumes. *International Journal of Food Microbiology* 10(3/4): 1990: 225-234

Growth, enterotoxin A (SEA) and thermonuclease (TNase) production of *S. aureus* (Strains CP 7 and FRI 722) was determined in media produced from the following heat or irradiation sterilized legumes: peas, black beans, mung beans, adzuki beans and soybeans. Media containing the five legumes alone or in combination with Brain Heart Infusion Broth (BHI) were tested. With the exception of heat-sterilized black beans and adzuki beans, *S. aureus* growth was excellent in all media with cell counts after 48 h (25 C) exceeding 10^8 cfu/ml. In black beans and adzuki beans cell counts were 1-2 log-cycles lower. Enterotoxin A was produced in amounts of 33 to 72 ng/ml in BHI after 48 h. Almost no toxin was produced in the 4 different beans following heat or irradiation treatment; in peas the toxin concn. reached 14 to 15 ng/ml. In the medium prepared from irradiated soybeans and BHI the final toxin concn. was about the same as in BHI alone. In all the other media consisting of a combination of legumes with BHI toxin concn. were three to four times higher than in BHI alone. Production of thermonuclease showed variation and did not always correlate with enterotoxin production. AS

315

Marquez (UML) and Lajolo (FM). In vivo digestibility of bean (*Phaseolus vulgaris* L.) proteins: The role of endogenous protein. *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1211-1215

The effects of ingestion of diets containing cooked whole beans, albumins, or globulins on the fecal N and S origin were evaluated in rats by employing ¹⁵N- and ³⁵S-labeled beans. The ingestion of whole beans caused the highest N and S excretion, mostly originated from exogenous sources. Whole beans and, to a lesser extent, albumins also increased metabolic fecal N excretion which represents approx. 20% of total N elimination. Isolated cooked bean globulins are well digested, having no effect on metabolic protein output. This suggested that other, nonprotein components present in whole beans may be involved in the increase of both exogenous and endogenous fecal protein. AS

316

Morrow (B). **The rebirth of legumes.** *Food Technology* 45(9); 1991; 96, 121

Legume production, consumption, export and the increasing awareness among the people about the nutritional benefits of legumes such as its high content in complex carbohydrates, protein and dietary fiber, especially water-soluble fiber which lowers the cholesterol in the blood are discussed in this article. CSA

317

Nielsen (SS). **Digestibility of legume proteins.** *Food Technology* 45(9); 1991; 112-114, 118

The article focusses on the factors that limit the legume protein digestibility of the common bean, *Phaseolus vulgaris*, the digestibility of protein fractions of dry bean as compared to other legumes, the degradation of phaseolin, the major storage protein of *P. vulgaris* and the comparative digestibility and the digestibility relationship of phaseolin in relation to other legume proteins. CSA

318

Lajolo (FM), Filho (FF) and Menezes (EW). **Amylase inhibitors in *Phaseolus vulgaris* beans.** *Food Technology* 45(9); 1991; 119-121

This article describes the occurrence, characteristics, kinetics and binding mechanism and the biological activity of α -amylase inhibitors which occur in common beans (*Phaseolus vulgaris*). CSA

Chickpea

Chickpea flour

319

Hussain (A) and Bushuk (W). **Detection of pea flour in flour of chickpea by lactate polyacrylamide gel electrophoresis.** *Journal of Food Quality* 12(6); 1989; 427-432

Polyacrylamide gel electrophoresis was applied to detect adulteration of chickpea flour with pea flour by the presence of extra bands in the unique electrophoregram of chickpea. Protein extracts prepared by a single extraction with 5M acetic acid produced patterns which were used to differentiate pea and chickpea samples. Using the described procedure, 10 var. of chickpea did not show intervarietal variation in their electrophoregrams, whereas 11 var. of pea showed intervarietal differences in their protein comp. However, six of the 25-30 protein bands present in electrophoregrams of most pea var. can be used as markers for detection of pea flour in chickpea flour. Band 37, present both in chickpea and pea samples, can be used as an internal reference for inter gel comparisons. AS

Cowpeas

320

Jindal (KK) and Thind (BS). **Microflora of cowpea seeds and its significance in the biological control of seedborne infection of *Xanthomonas campestris* pv. *vignicola*.** *Seed Science and Technology* 18(2); 1990; 393-403

External and internal microflora of normal, shrivelled and discoloured cowpea seeds (cv 'Pusa Barsati' and 'Pusa Dofasli') were studied using a seed washing technique. Of 5 species of bacteria and 17 species of fungi associated with the seed the following were most common: *Acinetobacter calcoaceticus*, *Erwinia herbicola*, *Pseudomonas acidovorans*, *Fusarium semitectum*, *Penicillium oxalicum* and *Trichothecium roseum*. In general, the seeds harboured a significantly higher population of bacteria than fungi. Discoloured seeds yielded the highest microbial populations. The total population of microorganisms isolated from internal tissues was significantly higher than that isolated from seed surfaces. A greater number of microorganisms was isolated from seeds of cv. 'Pusa Barsati' than from seeds of cv 'Pusa Dofasli'. *A. calcoaceticus*, *F. semitectum*, *T. roseum* and *P. oxalicum* were found to be associated mostly with discoloured seeds whereas *P. acidovorans* and *F. semitectum* were associated mostly with shrivelled seeds. Soaking or rolling cowpea seeds in cell suspensions of *A. calcoaceticus*, *P. acidovorans* and spore suspensions of *Aspergillus flavus*, *F. equiseti*, *F. semitectum*, *Rhizopus oryzae* and *T. roseum* resulted in significant reduction in seed germination. *A. calcoaceticus*, *Bacillus subtilis*, *Flavobacterium* sp., *P. acidovorans*, *A. flavus*, *Epilcicum nigrum*, *F.*

equiseti, *P. citrinum*, *P. oxalicum*, *R. oryzae* and *T. roseum* were inhibitory to *Xanthomonas campestris* pv. *vignicola* *in vitro*. Several organisms including *E. herbicola* and *P. oxalicum* were as effective as hot water (50 C for 30 min), solar heat, Streptocycline (100 µg/ml) + Captan (0.2%) and Streptocycline (100 µg/ml) + Agallol (0.2%) for the eradication of *X. campestris* pv. *Vignicola* from cowpea seeds. AS

321

Tuan (Y-H) and Phillips (RD). **Effect of the hard-to-cook defect and processing on protein and starch digestibility of cowpeas.** *Cereal Chemistry* 68(4): 1991; 413-418

Cowpeas were stored for 6 wks at 37 C for 85% r.h. for a test group and at 7 C for 60% r.h. for a control group. After storage, they were treated as follows: cooked for 45 min; cooked for 90 min; ground into a flour; made into a flour slurry (20% solid) and cooked as a gruel for 45 min; or ground into flour and extruded at 20% moisture with a barrel temp. of 150 C. The hard-to-cook defect was observed in the test group. The effect of storage conditions and processing treatments on the nutritional quality of cowpea protein and starch was determined by *in vitro* and *in vivo* (fecal and ileal digestibility) methods. The *in vitro* and ileal methods indicated that the protein digestibility of the control group was significantly higher than that of the test (hard-to-cook) group (78.5 vs. 75.3% and 76.9 vs. 66.6%, resp.); the fecal assay detected no difference. *In vitro* and ileal protein digestibility was highest in cowpeas cooked for 45 min (80.3 and 81.8% resp.) and lowest in cowpeas ground into flour (72.6 and 65.4%, resp.). Grinding before processing exacerbated the differences between the control and the test groups. Starch digestibility was enhanced by grinding before cooking but showed little response to storage conditions. AS

322

Echendu (TNC). **Ginger, cashew and neem as surface protectants of cowpeas against infestation and damage by *Callosobruchus maculatus* (Fab.).** *Tropical Science* 31(2): 1991; 209-211

Surface application of cashew nut (*Anacardium occidentale*) shell liquid was found to be superior to ginger (*Zingiber officinale*) and neem (*Azadirachta indica*) in reducing cowpea infestation by *Callosobruchus maculatus*. The results of the viability test also revealed no adverse effects on seed viability as a result of any of the treatments. BV

323

Phillips (RD) and McWatters (KH). **Contribution of cowpeas to nutrition and health.** *Food Technology* 45(9): 1991; 127-130

This article reviews the research conducted on cowpea an important source of protein and B-vitamins in Nigeria, its importance in Nigerian nutrition and the constraints to cowpea consumption. The article also describes the flour production technology for producing ready-to-use cowpea flour, its nutritional and physiological aspects, microbiological aspects, functional aspects and the implementation of the technology in village mills and US market. CSA

Cowpea pastes

324

McWatters (KH), Hitchcock (HL) and Resurreccion (AVA). **Effect of frozen storage on the quality of akara, fried cowpea (*Vigna unguiculata*) paste.** *Journal of Food Quality* 14(2): 1991; 165-174

Akara, a fried food made from whipped cowpea paste flavoured with onion, fresh hot/bell pepper and salt, stored at -18 C for 9 months showed significant difference in moisture, crude fat, shear, colour, hue angle, chroma and sensory colour, moistness, tenderness and flavour compared to the fresh sample. Two out of fifteen peaks were also significantly affected as revealed in headspace volatile analysis. SD

Dry beans

325

Hosfield (GL). **Genetic control of production and food quality factors in dry bean.** *Food Technology* 45(9): 1991; 98, 100-103

This article presents the background of common bean (*Phaseolus vulgaris*) its method of pollination, consumer preferences, production, export and consumption, plant breeding and early humans, exploitation of variability, plant breeding as an art and science. The nature of variability for traits in dry beans due to genetic causes, environmental causes, and heritability, the opportunities offered to genetically improve beans such as production factors, food quality, nutritional quality and culinary quality and the strategies for improvement are discussed. CSA

326

Uebersax (MA), Ruengsakulrach (S) and Occena (LG). **Strategies and procedures for processing dry beans.** *Food Technology* 45(9): 1991; 104-108, 110-111

This article presents an overview of diverse strategies and procedures such as constraints limiting dry bean utilization, postharvest handling and preparation, direct thermal preparation (cooking and canning), precooked prepared products (quick-cooking beans, frozen/dehydrated beans, extruded products and microwavable products), novel products and ingredients (bean meals, flours and powders; sprouts, curds and ferments), potential in nutrition and health (hypocholesterolemic effect, hypoglycemic effect and weaning foods) and research needs which could help to increase dry bean utilization. CSA

327

Hughes (JS). **Potential contribution of dry bean dietary fiber to health.** *Food Technology* 45(9): 1991: 122, 124-126

This article covers classification of dietary fiber (soluble and insoluble, structural and non-structural), role in reducing disease (coronary heart disease, diabetes and colon cancer) risk, physiological effects and mechanisms (serum cholesterol and coronary heart disease, glucose tolerance and colon cancer) and advantages. CSA

Green gram

328

Doharey (RB), Katiyar (RN) and Singh (KM). **Eco-toxicological studies on pulse beetles infesting green gram. IV. Comparative efficacy of some edible oils for the protection of green gram (*Vigna radiata* (L.) Wilczek against pulse beetles, *Callosobruchus chinensis* (L.) and *Callosobruchus maculatus* (F).** *Bulletin of Grain Technology* 28(2): 1990: 116-119

Oils of groundnut, mustard, rice bran, safflower, sesame, sunflower and taramira (*Eruca sativa*) were used at 0.10, 0.25, 0.50 and 1.0% concn. (w/w) to control *Callosobruchus chinensis* and *Callosobruchus maculatus* in green gram. Malathion 50% E.C. was used at 0.001% (10 p.p.m.) level. Coconut, groundnut and mustard oils at 1.0% (w/w) concn, controlled the pests effectively than the other oils upto 6 months after treatment. All the edible oils were more effectively controlled the pests than malathion. Sunflower oil at all the concn. against *C. chinensis* and safflower oil against *C. maculatus* were found less effective after 6 months of treatment. KAR

Mungbeans

329

Raghuvanshi (RS), Bhattacharya (L) and Singh (DP). **A study on the chemical composition and protein fractions of improved varieties of mungbean (*Vigna radiata* L. Wilczek).** *Bulletin of Grain Technology* 28(1): 1990: 18-21

The improved var. studied are Pant M-8, Pusa Baisakhi, S-9, T-1 and T-44. Crude protein content ranged from 23.33 to 26.98%, crude fibre from 3.61 to 4.91% and crude fat from 1.16 to 1.37%. Based on Mahalanobis D² statistics the test var. were clustered in which cluster A comprised of T-1 and T-44, cluster B, C and D comprised of S-9, Pusa Baisakhi and Pant M-8. Albumin fraction ranged from 62.11 to 66.59%, globulin from 18.64 to 26.57%, prolamin from 0.55 to 0.76% and residual protein from 8.89 to 16.25%, of the total protein. KAR

OILSEEDS AND NUTS

Cashewnuts

330

Vijay Singh. **Studies on chemical composition of varieties of cashewnut kernels, *Anacardium occidentale* (L.) for susceptibility to *Corcyra cephalonica* (Staint), *Tribolium castaneum* (Hbst) and *Oryzaephilus surinamensis* (L.).** *Bulletin of Grain Technology* 28(1): 1990: 4-8

Chemical comp. of three var. (Tree No. 1, Tree No. 39 and Tree No. 56) of cashewnut kernels, was studied to find out the differences if any, in their chem. comp. and how it related to their susceptibility to infestation by *C. cephalonica*, *T. castaneum* and *O. surinamensis*. It was found that least susceptible var. was characterized by low content of total N (5%), crude protein (15.55%), ash (2.5%) and Cu (0.05 p.p.m.) and high content of fat (47.8%), albumin (11.20%), globulin (8.24%), total sugars (39.9%) and reducing sugars (3.2%). The least susceptible var. *C. cephalonica* and *O. surinamensis* L. was for Tree No. 39. The least susceptible var. (Tree No. 39) also contained low fat free portion (47.8%), glutelin (7.8%), and Zn (0.53 p.p.m.). Tree No. 1 which is most susceptible also contained high Ca (90 p.p.m.), K (68 p.p.m.) and Fe (1.5 p.p.m.). Moisture content did not show any relationship to susceptibility of the var. KAR

Cottonseed

Cottonseed flour

331
Camire (ME), King (CC) and Bittner (DR). **Characteristics of extruded mixtures of cornmeal and glandless cottonseed flour.** *Cereal Chemistry* 68(4): 1991: 419-424

The effect of protein and dietary fiber supplementation on physical, chemical and sensory quality properties were evaluated by extrusion cooking of mixtures of cornmeal and glandless cottonseed flour. Response surface analysis was used to determine the effect of the level of cottonseed flour (0 -25%, w/w), barrel temp. (65.6 - 93.3 C), screw speed (350 - 450 r.p.m.), and moisture content (18 - 21%) on the characteristics of the dried extrudates. Increased levels of cottonseed flour reduced collet bulk density and resistance to shear and increased diametric expansion and darkness compared with cornmeal controls that were similarly processed. Extrusion reduced protein solubility and available lysine in samples. Water absorption capacity was dependent largely on the moisture content of the mixture. A sensory panel found the samples containing cottonseed flour to be less yellow, softer and processing a nutty flavour. Snacks containing 12.5% cottonseed flour were as acceptable overall as those containing only corn. Products containing higher levels of cottonseed flour may require seasoning to improve palatability. AS

Groundnuts

332
Singh (U), Singh (B) and Smith (OD). **Effect of varieties and processing methods on phytic acid and protein digestibility of groundnut (*Arachis hypogaea* L.).** *Journal of Food Science and Technology (India)* 28(6): 1991: 345-347

Processed groundnuts (cv 'Florunner', 'US No. 1') by boiling, water- and steam- blanching and roasting, and other var. (viz. 'TP 171-2', 'TP 172-2', 'TP 175-3', 'TP 175-6', 'TP 178-1', 'TP 18-3', 'TX AG-3' and 'RMP-12') were analyzed for protein, phytic acid, total P, N solubility and *in vitro* protein digestibility (IVPD). Phytic acid of 9 var. varied from 2.89 to 3.96 mg/g indicating significant differences among var. The IVPD values of these var. ranged from 66.8 to 77.5% with mean being 70.9%. There was a significant negative correlation between phytic acid and IVPD of these var. Removal of seed coat in the present study did not reveal noticeable differences in phytic acid, whereas it considerably influenced N solubility and IVPD values. Processing methods reduced the phytic acid of groundnut and effect was

more pronounced in boiling process (wet-heating) followed by blanching processes. Dry-heating (roasting) considerably reduced IVPD of groundnut, whereas it did not show any noticeable effect on phytic acid. AS

Linseeds

333
Vasishtha (AK), Bajpai (M), Pandey (S) and Rai (M). **Studies of the seed characteristics and composition of the oils in linum: New Pusa (NP) varieties.** *Journal of the Oil Technologists Association of India* 22(1): 1990: 9-19

One hundred and seventy New Pusa (NP) var. of linseed were analysed for oil, protein content, iodine value and fatty acid comp. after grouping them into NP-regular var., NP-rust resistant var., and NP-hybrid var. In NP-regular var. the oil content ranged between 28.5 and 45.1%, protein content from 12.9 to 23.3%, iodine values were 16.3 to 194.5, palmitic acid content was from 5.3 to 8% and stearic acid from 3.1 to 7.4%. The linolenic acid content was 41.3 to 61.3%. In NP-rust resistant var. the oil content ranged from 30 to 46.9%, protein from 14.1 to 21.6%, sp. gr. 0.914 and 0.928, iodine values showed wide variations, palmitic acid varied between 5 and 8% and stearic acid content ranged 3.2 to 7.8%, highest amount of oleic acid was 30.7% and lowest being 15.6%, the linoleic acid content ranged between 9.8 and 26.4% and linoleic acid content varied widely. In NP-hybrid var. one var. (NP-hyb-603-2(R)) contained > 46% oil and others had 40% oil content. The protein content was 13.7 to 20.4%. Variations in sp. gr. and saponification values were minor. Palmitic acid content ranged between 5.5 and 7.9%, and stearic acid between 3.3 and 7.3%. Oleic acid content varied from 16 to 29%. The linoleic acid content varied from 10.5 to 18.9% and linolenic acid from 45.8 to 58.3%. SRA

Niger

334
Nagaraj (G). **Fatty acid and amino acid composition of niger varieties.** *Journal of the Oil Technologists Association of India* 22(4): 1990: 88-89

Niger oil from 5 major var. (No. 71, Ootacomund, N5, RCR 18, IGP 76) were analysed. Oil content was highest in No. 71 (39.4%) followed by RCR 18 (37.2%); other three var. contained 30.9 to 33.4% oil. The refractive index of the oil was around 1.4715 and the oils had bright yellow colour (mean value 2.9 Y + 0.5 R). Oleic and linoleic acids were the main fatty acids (85%) No 71 and IGP 76 contained around 58% of linoleic acid and around 25% oleic acid. Ootacamund and N5 var. had higher level of oleic

acid (29%) and lower level of linoleic acid (52%). The crude protein content of the deoiled cake was higher in Ootacamund var. (43.44%) followed by No. 71 (40.25%). The other three var. had protein content of 37 - 39%. Methionine content was higher in No. 71, RCR 18 (2.3%) while cystine was higher in Ootacamund (2.4%). The total lysine content of the var. was 3 - 3.7%. Glutamine was the major amino acid (19%) followed by arginine (8%) aspartic acid (8%) and leucine (6%). Niger proteins is deficient in leucine and lysine. Based on the fatty acid and amino acid comp. No. 71 followed by Ootacamund var. appear to be better than the other 3 var. SRA

Soybeans

335

de la Barca (AMC), Vazquez-Moreno (L) and Robles-Burgueno (MR). **Active soybean lectin in foods: Isolation and quantitation.** *Food Chemistry* 39(3): 1991; 321-327

An improved method was developed to determine active soybean lectin in processed foods containing soybean. Freeze drying of crude extracts followed by affinity chromatography allowed to purify and quantitate active lectin. After dialysis, concentrated extracts from products were loaded on to a chromatography column of immobilized N-acetyl-galactosamine. Active lectin content of soy flours depended on the processing method used. The highest level found was for raw seeds (3600 µg/g), and the lowest for texturized flour (12.9 µg/g). Direct human consumption foods contained various lectin concn. While meat substitutes were free of active lectin, milk substitutes, and bakery products had low levels. A cereal type food and a cookie showed the highest lectin concn. (187.2 and 24.2 µg/g, resp.). AS

Soy products

Soy milk

336

Maity (TK) and Paul (SC). **Low-oligosaccharide soy milk: Application of α -galactosidase for hydrolysing soy-oligosaccharide.** *Indian Dairyman* 43(10): 1991; 443-448

Presence of oligosaccharides in soy milk cause flatulence in human system due to the shortage of α -galactosidase in human system. This paper reviews the work so far accomplished to hydrolyse oligosaccharides in soy milk thereby making it more suitable for human consumption. The aspects covered include the various sources of

α -galactosidase, its preparation especially from fungi, assay methods and its properties. Methodology involved in the preparation of soy milk, and the method of effecting the hydrolysis and the prospects of oligosaccharide hydrolysed soy milk have also been described briefly. SRA

Tempe

337

Matsumoto (I) and Imai (S). **Processing of soybeans for manufacture of tempe.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7): 1990; 497-504

Processing of soybeans for industrial manufacturing of *Tempe*, a traditional fermented soybean food in Indonesia, was investigated. The bacterial count of *Tempe* prepared from peeled soybeans was lower by 2 orders than those prepared from unpeeled soybeans. The bacterial count of *Tempe* was lowered by soaking peeled soybeans in an aqueous solution of an organic acid. Acetic acid gave the most effective results among organic acids employed. Namely, 0.2% level of acetic acid, 1.0% level of lactic acid, succinic acid and tartaric acid, or 3.0% level of citric acid was required in order to lower the bacterial count of *Tempe* to 10^4 /g level. It was appropriate to soak peeled soybeans in an aqueous solution of acetic acid at 17 to 20 C for 3 to 4 h. *Tempe* prepared from peeled and pressure-steamed soybeans was superior in taste to the one prepared from boiled soybeans. Steaming the peeled and soaked soybeans under 0.8 kg/cm^2 for 3 to 7 min made the hardness of the soybeans to 1.0 to 1.5 kg which gave appropriate condition to make *Tempe*. Satisfactory *Tempe* manufacturing may include the following process: peeling soybeans; soaking the peeled soybeans in 0.2% solution of acetic acid for 3 to 4 h; draining the beans; and steaming under 0.8 kg/cm^2 for 3 to 7 min. AS

TUBERS AND VEGETABLES

Onions

338

Sharma (PK) and Nirankar Nath. **Dehydration characteristics of ten onion cultivars.** *Journal of Food Science and Technology (India)* 28(6): 1991; 348-351

Onion var. were dehydrated as 5 mm thick rings in an air cabinet drier (65 plus or minus 2 C, 7 h). Dehydration reduced pungency (as pyruvic acid) and ascorbic acid levels, and induced browning; the extent of these changes depended upon var. Colour

of dehydrated product showed significant positive correlation with flesh colour but not the peel colour. Var. were ranked on the basis of quality of their dehydrated rings. 'VL-1' was found to be excellent, 'Pusa Red' was very good, and 'Punjab Red' and 'Sel-102-1' were good for dehydration. AS

Root vegetables

339

Aneez Ahamad (PY) and Ahmed (SM). **Potential of some rhizomes of Zingiberaceae family as grain protectants against storage insect pests.** *Journal of Food Science and Technology (India)* 28(6): 1991: 375-377

The comparative efficacy of indigenous plant species viz. *Alpinia galanga* Willd., *Curcuma amada* Roxb., *Curcuma longa* L., *Curcuma zedoaria* Rose, and *Zingiber officinale* Rose, all belonging to the family Zingiberaceae was evaluated against *Sitophilus oryzae* (L.) and *Corcyra cephalonica* (Staint.) infesting wheat *Triticum aestivum* Lam. All the powdered rhizomes tested were found significantly superior to control in protecting the grain at the concn. of 1 and 3% W/W in bringing about higher mortality of *S. oryzae* adults. The insect mortality was cent per cent in the treatments even at 1% level after 45 days. Besides, the treatments *C. amada* and *C. longa* were highly significantly effective in inhibiting the emergence of F₁ generation of the weevil followed by *A. galanga*, *C. zedoaria* and *Z. officinale*. While against *C. cephalonica* larvae, the treatment *A. galanga* was the best grain protectant even at 1% level after a period of 15 and 30 days. However, at 3% level there was no significant difference between *A. galanga*, *C. longa* and *Z. officinale* and they were superior in causing high larval mortality followed by *C. zedoaria* and *C. amada*. AS

Carrots

340

Premavalli (KS) and Arya (SS). **Effect of vegetable oils on the stability of carotenoids in carrot halwa.** *Indian Food Packer* 45(4): 1991: 22-28

Carrot halwa (a sweet meat) was prepared using safflower oil, coconut oil, palm oil and oil hydro each separately. Halwa was packed in polypropylene (60 µ) pouches (15 cm x 15 cm) and stored at 37 plus or minus 1 C. Carotenoids were more stable in carrot halwa with safflower oil (45.3%) than palm oil (41.1%), coconut oil (24.3%) and oil hydro (19.6%) after 3 months storage. But in lipophylic system of oils and hydrophylic system when coated on cellulose and exposure to various a w, β-carotene was more stable with coconut oil than with safflower

oil. In hydrophylic system, β-carotene (40 mg) dissolved in benzene and coconut oil/safflower oil (500 mg) were coated in microcrystalline cellulose (40 g). Similarly β-carotene and oils were coated on sugar, starch, pectin and carboxymethyl cellulose. On microcrystalline cellulose and carboxymethyl cellulose, coconut oil exerted better protection, safflower oil exhibited protective effect on sugar and pectin and there was no specific action on starch. The changes among adsorbents and interaction of oil-adsorbents were significant P = 05. In the presence of safflower oil, the regression coeff. of loss of β-carotene against storage period remained same both on sugar (67.7 µg) and on cellulose (68.8 µg) whereas in coconut oil the rate of degradation was more on sugar (95.1) than on cellulose (49.4). Sugar with safflower oil may cause better stability of carotenoids in halwa. VKR

341

Premavalli (KS), Vidyasagar (K) and Arya (SS). **Storage behaviour of vegetable halwas.** *Indian Food Packer* 45(4): 1991: 29-34

Halwa from carrot (*Daucus carota*) and pumpkin (*Cucurbita maxima*) was prepared and cooked as such or after adding potassium sorbate (0.134%, 6.7 g in 25 ml water) to a final Brix of 68⁰. They were packed separately in polypropylene (60 µ) (PP) and paper (60 GSM) - aluminium foil (40 µ) polyethylene (40 µ) (PFP) laminate pouches. They were stored at 37 plus or minus 1 C and at 15 - 35 C (room temp.). Treated carrot and pumpkin halwa remained stable upto one and two months in PP pouches and three and six months in PFP pouches resp. Changes in carotenoids, non-enzymatic browning during storage followed the same pattern in both the treatments. The loss of potassium sorbate in halwas was 4 - 15% in PP pouches and 0 - 6% in PFP. The changes in all the parameters in general were more predominant in PP pack than PFP pouches. It is concluded that the incorporation of potassium sorbate may be preferred than that of cooking as it will save energy consumption in processing. After 6 months of storage carotenoid retention was 52 and 69% in PP pouches as compared to 65 and 79.6% in PFP pouches in heat treated and sorbate treated samples resp. Considering the relative rates of carotenoid degradation, non-enzymatic browning, sorbate action and acceptance of the product, carrot halwa has a shelf-life of one month in PP and 3 months in PFP pouches and pumpkin halwa has a shelf-life of 2 months in PP and 6 months in PFP pouches. VKR

342

Phillips (KM) and Palmer (JK). **Effect of freeze-drying and heating during analysis on**

dietary fiber in cooked and raw carrots. *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1216-1221

Soluble and insoluble dietary fiber contents in raw and cooked carrots were measured by a modified Association of Official Analytical Chemists (AOAC) enzymatic-gravimetric procedure. Analyses were done on cooked and raw carrots, with and without freeze-drying and with and without heating during analysis. Heating for 1.25 h at 121 °C caused a 3 - 5 fold increase in soluble fiber and a comparable decrease in insoluble fiber, suggesting a conversion of the latter to the former. Cooked carrots generally had more (3 - 9 g/100 g) soluble fiber than the raw product, but when samples were both freeze-dried and analyzed with gelatinization, soluble fiber was equivalent (ca. 10 g/100 g). Hence, since standard dietary fiber methods generally include freeze-drying and gelatinization, differences in the amount of fiber in cooked and raw foods may be obscured. Sugar and uronic acid analyses on soluble fiber fractions suggested that cooking and/or gelatinization resulted in increased solubilization of pectin (polygalacturonan) and arabinogalactan. Results of the present study indicate that current dietary fiber values may not accurately represent the level of this component in some foods as they are eaten. AS

343

Marques (JPM), Rutledge (DN) and Ducauze (CJ). **Low resolution pulse nuclear magnetic resonance study of water equilibration in dried carrots.** *International Journal of Food Science and Technology* 26(2): 1991: 173-183

Samples taken during air drying of carrots were analysed after different equilibration times. Low resolution NMR measurements were made and the longitudinal (T_1) and the transverse (T_2) relaxation times calculated. Both T_1 and T_2 decreased with the equilibration time for water contents above 0.30 and 0.47 kg water kg⁻¹ dry matter, resp. The decrease in relaxation time increased with the water content. For the same water contents, grated carrots gave lower T_1 values and smaller T_1 decreases with equilibration time than 3-mm cubes. Low resolution NMR is a technique which is well suited to the monitoring of the tempering phases of industrial drying cycles. AS

Cassava

Cassava starch

344

Rickard (JE), Asaoka (M) and Blanshard (JMV). **The physico-chemical properties of cassava starch.** *Tropical Science* 31(2): 1991: 189-207

The present paper reviews recent reports on the physico and chemical properties of cassava (*Manihot utilissima*) starch (proximate analysis, granular characteristics, swelling and solubility, gelatinization profiles and enzymic digestibility) in comparison with other starch sources. The effect of cv and methodology used are also reviewed. 58 references. BV

Vegetables

345

Berrang (ME), Brackett (RE) and Beuchat (LR). **Microbial, colour and textural qualities of fresh asparagus, broccoli and cauliflower stored under controlled atmosphere.** *Journal of Food Protection* 53(5): 1990: 391-395

Fresh asparagus, broccoli and cauliflower were held under controlled atm. storage (CAS) and ambient air systems at 4 °C for 21 days. Samples were examined on the initial day of experiments and after 2, 4, 7, 14 and 21 days of storage. On each day of analysis, colour (value, chroma and hue angle) was measured. Texture was measured as J needed to shear the vegetable/mm² vegetable shear surface area. Total aerobic microbial populations were enumerated. Populations of total aerobic microorganisms were initially about 10⁴ - 10⁵ CFU/g on all three vegetables and grew to at least 10⁷ CFU by day 21 of storage. CAS storage significantly reduced the growth of microorganisms on broccoli but had no significant effect with the other vegetables. Asparagus stored under CAS was easier to shear and had slightly higher hue angles than those of asparagus stored under air. Cauliflower stored under CAS showed less decline in value. CAS extended the length of time vegetables were subjectively considered acceptable for consumption. However, overall results indicate that quality of vegetables, as determined by objective measurements of colour and texture, is not significantly influenced by CAS during refrigerated storage. AS

Brinjal

346

Saikia (L) and Ranganna (S). **Determination of thermal process for curried brinjal (*Solanum melongena*).** *Indian Food Packer* 45(5): 1991: 37-48

The pH (4.3) of fresh brinjal rose to 4.9 when curried necessitating low-acid processing. Thermal

resistance studies gave two D and Z values based on spore concn. of 10^3 and 10^4 tube⁻¹. Two methods of calculation of D values were used. Method for comparison of the heat resistance of *Clostridium sporogenes* in terms of classical heat resistance of *C. botulinum* was described. Several procedures for calculation of F-value and calculation of corresponding F₀ and BB by improved graphical and 5 formula methods are described. F₀ recommended for commercial processing of stuffed brinjal is 5.8 min which corresponded to Pt of 75 min at 240 F (115.6 C) and 45 min at 250 F (121.1 C). VKR

Leafy vegetables

Spinach

347

Hussein (L) and El-Tohamy (M). **Vitamin A potency of carrot and spinach carotenes in human metabolic studies.** *International Journal for Vitamin and Nutrition Research* 60(3): 1990: 229-235

Changes in plasma retinol and carotenoids was measured in 17 young males after daily ingestion of grated carrots, carrot juice or spinach leaves for 2 wks. Regression equations showed that the supply of 3350 and 4750 µg carotenes from 78 ml carrot juice (prepared from 185 g carrots) or 91 grated carrots, resp. were adequate in maintaining plasma retinol at a constant level in subjects with initial plasma retinol of 1.2 µmol/l. Under similar experimental conditions, 280 g boiled spinach leaves providing 12700 µg carotenes were required to maintain plasma retinol at a constant level. Apparent carotene digestibilities of 47 and 81% were obtained with carrot and spinach, resp. AS

Plantains

348

Firmin (A). **Chemical and physical changes in plantains (*Musa paradisiaca*) during ripening.** *Tropical Science* 31(2): 1991: 183-187

Ripening of plantain at a temp. of 26 °C showed reduction of skin thickness from 3.1 mm (mature green plantain) to 2.6 mm (yellow plantain). Sugar levels increased during ripening from 1.38% (mature green fruits) to 75.5% (very ripe plantains) and starch contents decreased correspondingly from 77.5% to 2.09%. Ripening also increased total acidity of the pulp. BV

Tomatoes

349

Thiagu (R), Nagin Chand, Habibunnisa (EA), Aravinda Prasad (B) and Ramana (KVR). **Effect of evaporative cooling storage on ripening and quality of tomato.** *Journal of Food Quality* 14(2): 1991: 127-144

Evaporative cooling (EC) storage (20 - 25 C, 92 - 95% RH) gave 100% ripening index (RI) with a ratio of 2.48 between redness (a) and yellowishness (b) and hue angle 22.1 in 15 days while the control stored tomatoes (*Lycopersicon esculentum* Mill cv. Rupali) (28 - 33 C, 45 - 65% RH) gave 83.3% RI, with a/b 1.59 and a hue angle of 32.9 degree. Significantly higher chroma development and lycopene content, lower nupture/shear stresses and moisture loss in EC stored fruits than the control. SD

Tomato juices

350

Dalmasso (JP) and Weise (KL). **Sensory and chemical effects of tomato juice acidified with malic and citric acids.** *Journal of Food Quality* 14(2): 1991: 145-152

The sensory quality of stored salted/unsalted tomato juice acidified/non-acidified showed no significant difference between non-acidified and malate acidified salted juice after 180 days. In unsalted juice there was significant difference between non-acidified and malate or citrate acidified juice. Malic acid enhanced saltiness of juice. The pH of all juice decreased initially, non-acidified juice returned to normal while that of acidified maintained lower values. SD

FRUITS

351

Tandon (DK), Kalra (SK), Singh (BP) and Neelima Garg. **Characterization of pectin from mango fruit waste.** *Indian Food Packer* 45(4): 1991: 9-12

The pectin was extracted from dry peel and kernel of immature and ripe Dashehari mango using 0.05 N HCl; 0.05 N NaOH and 0.3% sodium hexameta phosphate (SHMP). Yield of pectin (12.79%) was max. from ripe mango peel by SHMP extraction. The kernel of immature fruit contained higher pectin than that of ripe fruit while reverse trend was observed in peels of immature and ripe fruits. The quality of SHMP extracted pectin from ripe mango peel was better than that from immature fruit. Alcohol insoluble solids were higher in kernel from ripe fruit. The water soluble pectin was more in ripe fruit peel (12.8%) while alkali soluble fraction was higher in immature fruit peel (10.4). VKR

352

Rajasekhar (N), Mahadeviah (M) and Gowramma (RV). **Studies on the suitability of retortable pouches for packing banana puree and ivy gourd.** *Indian Food Packer* 45(5); 1991; 29-36

Suitability of retortable pouch from laminate of polyester/Al foil/polypropylene for packing nitrate rich products like banana puree and ivy gourd has been tested and compared with canning. During the 8 wk storage at ambient temp. (25 - 30 C) and 37 C, banana puree and ivy gourd packed in Al foil laminate pouch was preferred to canned product in taste, flavour and overall acceptability. Canned banana puree developed metallic taste and flavour which was not acceptable. There was no significant difference in moisture, ash, pH and acidity in both the products packed in pouch and can. Nitrate content reduced considerably in cans with heavy detinning. VKR

353

Aworh (OC), Nwankwo (CF) and Olorunda (AO). **Control of post-harvest losses in citrus fruits under tropical conditions: Effects of wax and fungicide.** *Tropical Science* 31(2); 1991; 177-182

Waxing (Shield Brite AP 40 wax) minimized wt. loss in oranges and grapefruits stored at 21 - 31 C and 71 - 96% r.h. and when used in combination with washing in 0.1% benomyl or 0.5% sodium dehydroacetate, increased the marketable life and enhanced the appearance without adversely affecting chemical quality attributes. BV

Dates

354

Yousif (AK), Morton (ID) and Mustafa (AI). **Processing, evaluation and water relations of date paste.** *Tropical Science* 31(2); 1991; 147-158

Date (*Phoenix dactylifera*) paste prepared from 'Ruzeiz' dates has a lower a_w value (0.41) and its water sorption isotherm is of sigmoid shape. Date paste contains high levels (78%) of invert sugar, is a good source of minerals and trace elements, and its high level of dietary fiber (7%) is of particular interest. The optimum steaming time is 3 - 5 min and for soaking 5 - 10 min. A moisture content of 23% (0.65 a_w) for date paste could be considered as the lower safe limit for microbial spoilage. Hysteresis is apparent in date paste isotherms and over the entire r.h. range. BV

355

Yousif (AK), Morton (ID) and Mustafa (AI). **Effect of storage and packaging on some chemical and physical properties of date paste.** *Tropical Science* 31(2); 1991; 159-169

The effect of different techniques (soaking, steaming, with or without citric acid or ascorbic acid), storage time (2, 4, 8, 16 wks), storage temp. (5, 25, 50 C) and pack type (can, glass jars and polyethylene bags) on some of the chemical and physical properties of date paste were studied. Date paste retained an acceptable colour for 16, 8 and 2 wks when stored at 5, 25 and 50 C resp. The decrease in both sugar content and pH after 16 wks storage is pronounced at 50 C, whereas it is slight at 25 C and undetectable at 5 C. Moisture loss is considerable in the polyethylene-packed date paste after 16 wks storage. Irrespective of pack type, storage time causes a marked and gradual increase in the hardness of the date paste. Viscosity and a_w are slightly affected by both storage time and pack type. In contrast, neither storage time nor pack type affects the sorption isotherm of the date paste at low and medium relative humidity (7 - 75%). AS

Galgal

356

Mahajan (R) and Lal (BB). **Evaluation studies on Himachal galgal (*Citrus pseudolimon* Tan.) for processing industry.** *Journal of Food Science and Technology (India)* 28(6); 1991; 378-380

Galgals from two geographic locations viz., Palampur and Narpur in the Kangra valley of Himachal Pradesh were evaluated for physical and chemical characteristics of fruits with special reference to recovery of juice as well as yield and quality of oil and pectin from their processing waste. Yield and quality of oil and pectin were reasonably good from the waste of fruits from both the locations. Pectin yield from rags was much higher than from peel. Methoxyl content, degree of esterification and jelly grade of pectin extracted from rags were higher than those from other fruit components. Alcohol precipitation method gave higher pectin yield of good quality than aluminium chloride precipitation. A good quality oil was obtained by all the methods used for extraction though the cold press method gave the lowest yield. Fruit from Palampur gave higher oil yield. AS

Grapefruits

357

Miller (WR), Chun (D), Risse (LA), Hatton (TT) and Hinsch (RT). **Conditioning of Florida grapefruit to reduce peel stress during low-temperature storage.** *Hortscience* 25(2); 1990; 209-211

'Thompson' pink grapefruit (*Citrus paradisi* Macf.), waxed or film-wrapped, treated with thiabendazole (TBZ) or untreated, were used to determine the effect of high-temp. conditioning at 31 C for 3 days on fruit during subsequent storage for 4 wks at 1 or 10 C. Chilling injury (CI) developed in all conditioned fruit stored at 1 C, but was drastically reduced in film-wrapped compared to waxed fruit. Thiabendazole slightly reduced CI, and fruit held at 10 C had fewer CI symptoms than those held at 1 C for 4 wks. Conditioning Florida grapefruit at 31 C for 3 days did not allow subsequent storage at 1 C without rind discoloration. AS

Grapes

358

Saura-Calixto (F), Goni (I), Manas (E) and Abia (R). **Klason lignin, condensed tannins and resistant protein as dietary fibre constituents: Determination in grape pomaces.** *Food Chemistry* 39(3): 1991: 299-309

Dietary fibre (DF) detn. were carried out in grape pomaces by AOAC and spectrophotometric procedures. Insoluble dietary fibre (IDF) and Klason lignin (KL) residues contained appreciable amounts of condensed tannins (CT) and resistant protein (RP). The presence of CT and RP in the residues obtained after the successive action of amylase, protease and amyloglucosidase and chemical treatments with H₂SO₄ and HCl-triethyleneglycol, together with similar data previously reported for other samples could be considered in a wider definition of the DF complex as 'indigestible polysaccharides, phenolic polymers and resistant protein'. The term 'phenolic polymers' include both lignin and CT. AS

Mangoes

359

Pokharkar (SM) and Suresh Prasad. **Studies on the proteins of mango kernel flour.** *Indian Food Packer* 45(4): 1991: 17-21

Optimum conditions for isolation of protein from the deoiled mango kernel flour was determined. Factors studied included (i) successive extraction, (ii) different particle size (25, 44, 70 and 100 mesh passing), (iii) ratio of sample wt. to solvent vol. (1 g flour mixed with 10, 15, 20 and 30 ml of 2% NaOH), (iv) extraction time (0.5, 1.0, 1.5, 2.0 and 2.5 h), (v) extraction temp. (30, 40, 50, 60 and 70 C), and (vi) different pH levels (pH 1 - 12). Optimum protein could be extracted if the particle size of mango kernel flour of < 100 µ; sample wt. to solvent vol. ratio of

1:20, extraction time of 1.5 h, and temp. of 40 C. Protein extraction is highest (60%) in alkali medium with pH 11. VKR

360

Chakraborty (S), Bisht (HC), Agareal (MD), Verma (LN), Shukla (IC), Madaiah (N), Krishnaprakash (MS), Nanjundaswamy (AM). **Studies on varietal screening of mangoes of Uttar Pradesh for their suitability for production of canned nectar, juice and pulp.** *Indian Food Packer* 45(5): 1991: 49-57

Suitability of mango var. Dusehari, Chausa, Safeda, Tamburia Dusehari, Mala Fazli, Mallika Bhagwankera and Golbhadiya, grown in Uttar Pradesh, India for processing into canned mango nectar, juice and pulp was studied. The pulp from fully ripe fruits were canned and used for preparing canned nectar and juice. The canned products were stored for 4 - 6 months at ambient conditions (23 - 28 C) and analysed for physical, chemical and sensory qualities. The pulp content was min. (40%) in Safeda var. and max. (70%) in Lucknow Fazli and Golbhadiya var. The total soluble solids was min. (13%) in Golbhadiya and max. (22%) in Dusehari var. Dusehari and Mallika had excellent colour and flavour. Canned nectar and juice from 7 var. were ranked for colour, aroma, taste and overall acceptability. Dasherri and Tamburia Dusehari were as good as Alphonso var. for canned mango nectar and juice. Nectar and juice made from Safeda and Lucknow Fazli were inferior in quality. VKR

361

Ranote (PS), Saini (SPS) and Bawa (AS). **Effect of packaging material on heat penetration in Dusehari mango pulp.** *Research and Industry, India* 36(4): 1991: 249-251

Suitability of flexible container for packing and storage of Dusehari mango pulp was tested by packing mango pulp in bottles (200 ml) and in polypropylene (300 gauge) pouches. Cold points for both bottled and pouched mango pulp were found to be at the geometric centre indicating conduction heating. Pulp recovery was 85.5%; av. fruit wt. was 171 g. The trimming and coring losses were 4.2%, peel loss was 12% and handling loss was 3.8%. The pulp contained 22% total solids. It was low in protein (0.43%) and rich in pectin (0.55%). The rate of heat penetration was faster for the flexible container, than the rigid glass bottles, indicating the superiority of flexible pouch for thermal processing as it saves time and energy. GS

362

Dunlop (JR), Lingle (SE) and Lester (GE). **Ethylene production in netted muskmelon subjected to postharvest heating and refrigerated storage.** *Hortscience* 25(2): 1990: 207-209

Post-harvest ethylene levels and the precursor of ethylene i.e. aminocyclopropane-1-carboxylic acid (ACC) levels were determined in netted muskmelons at two temp. extremes i.e. 45 and 4 C, using sealed polyethylene bags to protect the fruits from high and very low temp. injuries. It was observed that temp. imposed restriction ethylene synthesis was reversible at a step which converts ACC into ethylene while the concn. of ACC remained constant the production of ethylene at different temp. varied. Further experimental details are presented. BV

Plums

363

Robertson (JA), Meredith (FI), Lyon (BG) and Norton (JD). **Effect of cold storage on the quality characteristics of 'AU-Rubrum' plums.** *Journal of Food Quality* 14(2): 1991: 107-117

The size, soluble solids and total sugar contents (glucose, fructose and sorbitol) were significantly higher ($P < 0.05$) in mature plums. Plums stored at 0 C for 5 wk and ripened at 20 C showed no significant effect on physical, chemical or sensory characteristics. The storage life of plums indicate potential for shipment to distant markets. SD

Sweet cherries

364

Drake (SR), Moffitt (HR) and Kupferman (EM). **Quality characteristics of 'Bing' and 'Rainier' sweet cherries treated with gibberellic acid, following fumigation with methyl bromide.** *Journal of Food Quality* 14(2): 1991: 119-125

Gibberellic acid treatment increased firmness, superior fruit and stem colour with less pitting in sweet cherries. Methyl bromide fumigation did not influence wt. loss, fruit colour or soluble solids, increased pitting and reduced objective and subjective stem colour. Increased fumigation temp. increased bruising and pitting and decreased stem colour. SD

CONFECTIONERY, STARCH AND SUGAR

Chocolate

Cocoa beans

365

Bopaiah (BM). **Studies on cocoa processing. III. Cotyledon pH as an index of fermentation.** *Indian Cocoa, Arecanut & Spices Journal* 14(4): 1991: 145-147

The termination of fermentation and the withdrawal of beans for drying is important to obtain quality beans. This could be decided by monitoring the cotyledon pH. During the initial stage of fermentation (first 48 h), the cotyledon pH lowered. The pH was min. on 3rd and 4th day of fermentation thereafter it increased. The following pH range is suggested for the termination of fermentation - sun-drying pH 4.8 to 5.1; slow artificial drying pH 4.9 to 5.1; quick artificial drying pH 5.2 to 5.3. GS

366

Rossi (M), Arnoldi (C), Antoniazzi (F) and Schiraldi (A). **Supercritical fluid extraction of cocoa lipid with carbon dioxide.** *Italian Journal of Food Science* 1(3): 1989: 31-40

Supercritical fluid has proved to be suitable for the extraction of various lipid-bearing materials. The feasibility of application of this technology in the cocoa industry is investigated here through the study of the solubility of cocoa fat in supercritical CO₂ as a function of temp. and pressure. Extraction trends for three different cocoa products, namely liquor, unroasted nibs and some fat-rich shells, are also reported. At pressures over 300 bar, cocoa fat solubility increases as the temp. and pressure increase. In the case of the liquor, a high degree of disruption of the lipid-bearing cells is obtained and this allows for an extraction yield of almost 100%. AS

367

Rossi (M), Arnoldi (C), Salvioni (G) and Schiraldi (A). **Characterization of cocoa extracts obtained with supercritical carbon dioxide.** *Italian Journal of Food Science* 1(3): 1989: 41-50

The composition of extracts obtained by supercritical CO₂ extraction of cocoa liquor, unroasted nibs and shells is examined. A minor variation in the composition of the triglyceride extract as a function of extraction time appears to be due to varying selectivity of supercritical CO₂ for triglycerides of different chain lengths. The effect, which is negligible when extraction is performed at 400 bar, becomes more evident at an extraction pressure of 300 bar. Fat obtained from the

extraction of liquor satisfies the composition requirements for cocoa butter, while that obtained from shells is distinguished by its excessive content of linoleic acid and unsaponifiable matter. AS

Starch

368

Meuser (F), Gimmler (N) and Oeding (J). **System analytical consideration of derivatization of starch with a cooking extruder as reactor.** *Starch/Starke* 42(9): 1990: 330-336 (De)

A methodical procedure is presented with which a systematic examination was made of the influence of the extrusion conditions on the degree of derivatization of potato starch to cationic and carboxymethyl starches. The procedure is based on a systems analysis approach originally developed for the extrusion of starch and starch-containing substances. Using regression equations it could be shown that, during the derivatization of starch, functional relationships also exist between the process and the most important system parameters (product temp., specific mechanical energy input, mean residence time). However, these parameters alone are insufficient to be able to describe the relationship between the system and the structure parameters, of which the reaction efficiency (R.E.) is considered to be the most important. A correlation calculation in which the moisture content was included as a fourth system parameter resulted in a far better description of the functional relationship between the system parameters and the R.E. on which the degree of substitutions is directly dependent. However, it is not possible to present this 4-dimensional dependence graphically. For this reason further systems analysis was carried out under conditions of constant moisture content. In this approach the cold paste viscosity (CPV) of the derivatives, as an example for the physico-chemical properties of the derivatives produced by extrusion cooking, were included in the systems analysis model. It emerged from the results that the pH-value of the extruders decisively influenced the CPV. With the aim to find extrusion cooking conditions which enable a max. R.E., the graphical representation of the dependence of the R.E. from the system parameters was extrapolated beyond the investigated examination area. Control tests showed that the regression equations could not describe the relationships outside the investigated area. AS

369

Hansen (LM), Hosney (RC) and Faubion (JM). **Oscillatory rheometry of starch-water systems: Effect of starch concentration and temperature.** *Cereal Chemistry* 68(4): 1991: 347-351

An oscillatory probe rheometer was used to measure the rheological properties (G^* , G' and G'') of corn starch-water systems throughout the sol-to-gel transformation. Starch-water suspensions of 5, 7, and 10% (w/w) were heated to endpoint temp. (EPTs) of 81, 86 and 92 C, and the rheological properties of the pastes and resulting gels were measured. As starch concn. increased, G' increased. For all concn. analyzed, G' varied depending on EPT. In general, G' was lower for suspensions heated to 81 C than for suspensions heated to 86 or 92 C. The temp. of the sol-to-gel transformation was determined from the slope of the loss tangent and was dependent on starch concn. and EPT. The higher the starch concn. the higher the temp. of the sol-to-gel transformation. Regression analysis determined that the amount of amylose and amylopectin leached from the granules, the swelling power of the granules, and the insoluble granules all interact and affect the rheological properties of the resulting gel. High soluble amylose levels and swelling powers increased gel elasticity, whereas high levels of soluble amylopectin were detrimental to gel formation and reduced elasticity. AS

370

Conde-Petit (B) and Fischer (F). **Rheological investigations with starch emulsifier systems.** *Getreide-Mehl und Brot* 45(5): 1991: 131-135 (De)

Sugar

371

Nath (S), Jain (SK), Gupta (SK) and Shah Alam. **A review on deterioration of sugar in godowns.** *Indian Sugar* 41(6): 1991: 389-392

The article briefly reviews how the important factors like humidity, temp. and microorganisms cause deterioration of sugar in storage. The deterioration could be checked by controlling the above three factors and also properly designing the sugar godowns to minimise the ingress of moisture. 17 references. SRA

372

Patel (HS), Mehta (NJ), Patel (MP), Vashi (RD) and Mevada (KD). **Effect of phosphatic fertilizers on yield and quality of sugarcane.** *Indian Sugar* 41(6): 1991: 395-397

A field trial was conducted on clayey soil of Navasari in rabi seasons of 1985-86 and 1986-87 comprising five sources of phosphatic fertilizers. All phosphorus and potash at 100 Kg/ha each were applied at planting while N at 1250 Kg/ha was applied in three splits. Results showed that the

sources of phosphatic fertilizer did not influence the cane yield and juice quality. Phosphorus in any form significantly enhanced commercial cane sugar %. SRA

373

Bangar (KS), Sharma (SR) and Sharma (RK). **Effect of iron and zinc on yield and quality of sugarcane.** *Indian Sugar* 41(6): 1991; 403-404

A field experiment was conducted in 1988-89 at the research farm, with popular sugarcane cv. CO 6304 with the application of ferrous sulphate (25, 50 and 75.0 kg/ha) and zinc sulphate (20, 50, 75 kg/ha) in clay loam soils having pH 7.8. Results showed that the application of 75 kg/ha each of FeSO_4 and ZnSO_4 increased the sucrose content to a max. of 17.18 and 16.60% resp. but the recovery % was max. at 50 kg/ha both FeSO_4 and ZnSO_4 . SRA

BAKERY PRODUCTS

374

Rama (MB). **Functions of ingredients in the manufacture of bakery products.** *Indian Miller* 22(1): 1991; 20-22

Various ingredients that are used in the manufacture of bakery products (bread, biscuits, cakes, pasteries, puff pasteries, patties and buns of various types, doughnuts and pizzas) include wheat flour, sugar, fat, emulsifiers, yeast, milk products, sugar products, liquid glucose, malt extract, egg flavouring agents, colouring agents, preservatives, proteolytic and amylolytic enzymes. The role of these ingredients, the quantity to be added and the latest trends have been briefly reviewed. SRA

375

Brochetti (D) and Penfield (MP). **Sensory characteristics of bakery products containing distillers' dried grain from corn, barley and rye.** *Journal of Food Quality* 12(6): 1989; 413-426

A commercially available distillers' dried grain (DDG) was chemically and physically characterized and the effects of varying levels of the DDG on the sensory characteristics of bakery products were studied. Total dietary fiber (51.22%) and protein (26.59%) were the principal constituents of the DDG. Compared with all-purpose flour, the DDG was more acidic, absorbed more water and oil, and was darker in colour. Consumer panels evaluated the acceptabilities and intensities of sensory characteristics of corn muffins, hush puppies, spiced doughnuts, and molasses-raisin cookies containing 10, 20 and 30% DDG (flour-wt. basis).

As the replacement level of DDG increased, the appearance, flavour and texture of the products were adversely affected; however, acceptable products were prepared with either 10 or 20% DDG. AS

376

Fasse (H). **Product liability with baked products.** *Getreide-Mehl und Brot* 45(5): 1991; 152-153 (De)

Bread

377

Sidhu (JS), Seibel (W) and Meyer (D). **Gelatinization of starch during preparation of Indian unleavened flat breads.** *Starch/Starke* 42(9): 1990; 336-341

The comparison of starch granule deformation and extent of starch gelatinization in a few common Indian unleavened flat breads (Chapati, Parotha and Poorie) was made. The starch granule swelling was evaluated by scanning electron as well as polarized light microscopy. The peak viscosity in Haake rotary viscosimeter and hydration capacity were used for comparing the extent of starch gelatinization in crust and crumb of these baked products. Although a few of the starch granules on the outside of crust, maintained a weak outline those in the crumb area gave only a matrix of gelatinized starch. The extent of starch gelatinization was reflected by the related increase in hydration capacity of these products. However, the peak viscosity values were found to be inversely related to the extent of starch gelatinization. As compared to crumb, a higher extent of browning was observed in the crust. Water absorption, type of cereal, mode and efficiency of heat transfer were found to control the extent of starch gelatinization in these baked products. AS

378

Defloor (I), De Geest (C), Schellekens (M), Martens (A) and Delcour (JA). **Emulsifiers and/or extruded starch in the production of breads from cassava.** *Cereal Chemistry* 68(4): 1991; 323-327

A nutritious breadlike product can be prepared from cassava (*Manihot esculenta* Crantz) flour fortified with defatted soy flour (20%) by incorporation in the formula of either a viscosity-enhancing agent such as prehydrated extruded starch (12 - 15%) or surface-active materials such as self-emulsifying glyceryl monostearate (2 - 3%). The latter agent results in a greater air uptake at mixing, as exemplified by greater volumes at the end of the mixing stage, and both agents lead to improved gas retention during fermentation. Experimental data suggest that gas retention in the first phase of fermentation of cassava batters is influenced only to

a small extent by the agents applied and that their action is based on a delay of the attainment of the critical buoyant size of the gas cells. Whereas the delay by the surface-active agent is based on the fact that more and smaller gas cells are formed during mixing, the effect of the pregelatinized material is due to a viscosity change, resulting in an increase of the critical buoyant size. During the baking phase, they influence the pasting properties of the starch and have a positive impact on the volume and crumb structure of the resulting products. Incorporation of surface-active material (4%) leads to a volume increase of 30%, whereas a much greater quantity of extruded starch (9 - 12%) is necessary to ensure a more modest volume increase (12%). At the same time, both the emulsifier and the extruded starch are responsible for good eating and keeping qualities. AS

379

Pomeranz (Y), Huang (M) and Rubenthaler (GL). **Steamed bread. III. Role of lipids.** *Cereal Chemistry* 68(4): 1991: 353-356

The effects on volume, compressibility (softness), and overall score of Chinese steamed bread of flour lipids, shortening and vegetable oils, and emulsifiers (hydroxylated lecithin, distilled monoglycerides, and ethoxylated monoglycerides [EMG]) added to an untreated and a petroleum ether defatted soft white wheat flour were determined. Defatting significantly reduced volume and softness of steamed bread. The control, defatted, and reconstituted flours showed a shortening response. Doubling the amount of added free lipids (from 0.86 to 1.72%) had no additional restoring effect beyond that from reconstituting the defatted flour to the original level of free lipids. Shortening at the 2% level provided the best steamed bread; replacing shortening by soybean or corn oil produced comparable breads. In defatted flour, 0.1% EMG and especially 0.2% hydroxylated lecithin, alone or in combination with 2% shortening, increased volume and improved softness; each was superior to shortening alone. Adding 0.1% EMG and especially 0.2% lecithin to defatted flour baked with 1 or 2% corn oil increased volume and softness of steamed bread. None of the combinations among lecithin, EMG, or distilled monoglycerides was superior to any of the single emulsifiers. AS

380

Seibel (W), Brummer (J-M) and Neumann (H). **Production of oat bread (labelling, nutritive value, raw materials, process engineering).** *Getreide-Mehl und Brot* 45(5): 1991: 140-145 (De)

Cake

381

Delcour (JA), DeGeest (C), Hoseney (RC) and Shelke (K). **Glycine derivatives as the source of carbon dioxide in cake formulations.** *Cereal Chemistry* 68(4): 1991: 369-371

Two glycine derivatives - N-carboxyglycine disodium salt (CAS 35783-03-0) and its glycine salt - were studied as alternative sources of CO₂ for leavening cakes. The release of CO₂ from these products was governed by the same pK_a value as that for sodium bicarbonate. When used in combination with fast, moderately fast, or slow leavening acids, the volumes of the final products prepared with glycine derivatives compared well with those of cakes prepared with sodium bicarbonate. Thus the glycine derivatives appeared equal to sodium bicarbonate in this respect. The products prepared with the different CO₂ sources all appeared similar except for crust colour, which was pleasantly darker in the cakes with the glycine derivatives. AS

Chapathies

382

Syed (HM), Rathi (SD) and Sawate (AR). **Studies on improving the chapathi quality.** *Indian Miller* 22(1): 1991: 26-31

The whole meal atta from HD-2189, N-59, and GC-464 wheat var. were used to prepare chapathies. The dough was fermented for 2, 4 and 8 h with and without the addition of lactic acid. Chapathi baking characteristic showed that the dough colour of HD-2189 and N-59 was creamish and GC-464 was dull white. The dough behaviour during handling was normal in all three var. N-59 chapathies were fully puffed, GC-464 were near to full puffing and HD-2189 were partially puffed on baking. The baking loss was 19.85 to 21.00%. The colour of control chapathies was whitish or creamish yellow, and were liked by consumers. The flavour was not affected by 4 to 8 h fermentation of dough using baker's yeast (0.5%). In general the texture of chapathies was improved by fermentation with or without lactic acid. The puncture strength was max. in chapathies prepared from GC-464 followed by HD-2189 and N-59. Fermentation produced chapathies requiring more strength to puncture as compared to yeasted and/or acidified chapathies. Lactic acid softened the chapathies more than yeasted chapathies. Even after 12 h of storage of chapathies prepared from pH adjusted yeasted dough and rested for 4 to 8 h, required only 50% of puncture strength as that of control fresh chapathies. SRA

383

Ranhotra (GS), Gelroth (JA) and Eisenbraun (GJ). **High-fiber white flour and its use in cookie products.** *Cereal Chemistry* 68(4): 1991: 432-434

White flour subjected to repeated autoclaving and cooling cycles showed an increase in total dietary fiber more than three times of bread flours and four times that of pastry flours. The increase was primarily due to the formation of resistant starch. The treated flour was substituted for 75 and 50% of the untreated flour of the formula for chocolate chip and oatmeal raisin cookies, resp., before physical and organoleptic characteristics became adversely affected. AS

Pasta

384

Cole (ME). **Prediction and measurement of pasta quality.** *International Journal of Food Science and Technology* 26(2): 1991: 133-151

Flavour, appearance, texture measurement (sensory techniques, instrumental techniques and chemical techniques) of pasta has been reviewed in this article. 139 references. BV

385

Pavan (G). **Market tendencies and technological aspects of fresh pasta.** *Getreide-Mehl und Brot* 45(5): 1991: 156-159 (De)

MILK AND DAIRY PRODUCTS

Milk

386

Pandey (JN). **Induction of lactation and utilization of milk for human consumption.** *Indian Dairyman* 43(11): 1991: 493-500

A review of the published data on hormone induction to cows and utilization of the milk produced. Evidence has been provided to indicate that milk from cows induced to lactate through administration of gonadal steroids is comparable to milk from parturient cows. The milk is a poor source for excretion of injected hormones and after the 3rd wk of induced lactation the levels of estrogens in milk are no more than under normal lactation. SRA

387

Batish (VK), Nataraj (B) and Sunita Grover. **Heat resistance of enterotoxigenic *S. aureus* in milk, reconstituted infant food and cream.** *Journal of Food Science and Technology (India)* 28(6): 1991: 391-393

Heat treatment of cells of *Staphylococcus aureus* strains 234, 834, 1151M, 790, S₆ and non-enterotoxigenic (NT) in different menstrua at 50, 55, 62.5 C for different time intervals resulted in their non-logarithmic death and hence F-values were determined. *S. aureus* 234 was the most heat resistant in both cow and buffalo milks as well as reconstituted infant food as evidenced by an F value of more than 120 min at 62.5 C. It was followed by *S. aureus* S₆, 834, 1151M and 790. Buffalo milk conferred maximal protection to all the strains. The maximal recovery of *S. aureus* after heat treatment was recorded with soybean-casein-digest-agar as compared with Baird Parker's agar. Both *S. aureus* 234 and S₆ survived at 71 C in pasteurized cream upto 120 min. The typical colony characteristics of the survivors from the cream on Baird Parker's medium were altered. AS

388

Jackman (R), Chesham (J), Mitchell (SJ) and Dyer (SD). **Performance of a rapid ELISA for penicillin G in milk.** *Journal of the Society of Dairy Technology* 43(4): 1990: 93-95

A rapid enzyme-linked immunosorbent assay (ELISA) for the detection of penicillin G in milk at concn. of 6 ng/ml (0.01 IU/ml) was used to screen 1651 off-farm samples previously reported as containing no detectable levels of antimicrobial substances. Using a single-well per test format and a percent inhibition cut-off for the detn. of positive/negative endpoint, 3.1% positives were obtained. Comparison with intra-assay standards lowered the numbers of positives to 0.42%. Analysis of 170 milk samples positive for antimicrobials confirmed 92.4% as containing penicillin G using the prescribed cut-off level and 87.6% when compared to standards. The ELISA, now available commercially in kit form, analyses between 1 and 48 samples in 15 min. It will detect 0.01 IU/ml to a level of confidence of 99% and 0.005 IU/ml with between 75 and 95% confidence. AS

389

Grufferty (MB) and Mulvihill (DM). **Hydration related properties of protein isolates prepared from heated milks.** *Journal of the Society of Dairy Technology* 43(4): 1990: 99-103

The hydration related properties of sodium caseinate, conventional casein-whey protein co-precipitate prepared from milk heated at 90 C x

15 min at pH 6.6 and milk protein isolates prepared from milk heated at 90 C x 15 min at pH 7.5 or at 60 C x 3 min at pH 10.0 were determined. Conventional acid-precipitated casein and the acid-precipitated protein isolates prepared from milks heated at pH > 7.0 had similar solubility and reconstitution properties which were better than those of a conventional co-precipitate. Water sorption isotherms for all the proteins were similar. Viscosities followed the order: conventional co-precipitate > milk protein isolates > sodium caseinate. AS

390

Heape (J). **The role for goats in today's dairy industry.** *Journal of the Society of Dairy Technology* 43(4); 1990; 111-114

391

Champagne (CP), Girard (F) and Morin (N). **Inhibition of the psychrotrophic bacteria of raw milk by addition of lactic acid bacteria.** *Journal of Food Protection* 53(5); 1990; 400-403

The inhibitory activity of lactic acid bacteria (LAB) on the psychrotrophic bacteria of raw milk was studied with reference to inoculation level, pH development, media for culture preparation and heat treatment of milk. Two commercial cultures of LAB:RMI and L-12 were used in this study. Inoculation levels of 2.5×10^6 /ml and less of LAB did not significantly reduce psychrotrophic growth. Max. inoculation level of LAB studied was 25×10^6 /ml and this reduced psychrotrophic development by a factor of 10; however, milk pH was reduced to 6.54 over 48 h of incubation at 7 C with this inoculation level. This acidification was not responsible for the inhibitory activity of LAB on psychrotrophs. The LAB were more effective when psychrotroph populations had high multiplication rates. *Pseudomonas putida* grew faster in sterile milk than in pasteurised milk, but av. inhibition rates of LAB were similar in both media. BV

392

Halpin-Dohnalek (MI) and Marth (EH). **Growth of *Staphylococcus aureus* in milks and creams with various amounts of milk fat.** *Journal of Food Protection* 52(8); 1989; 540-543

Staphylococcus aureus strains 100-A, 196-E, 254, 473, 505, and 521 generally grew better in skim milk and whole milk (3.5% milk fat) than in light cream (18% milk fat) and heavy whipping cream (36% milk fat) at 25 and 37 C. *S. aureus* strains grew to greater than 10^6 /ml from an inoculum of ca. 10^3 /ml in skim and whole milk held at 37 C. From the same level of inoculum, strains grew to 10^6 - 10^7 /ml in light cream held at 37 C. A 10 to 100-fold increase

in population was observed for most strains in heavy whipping cream inoculated with ca. 10^4 *S. aureus*/ml and held at 37 C. Less than a 10-fold increase in population was noted for strain 254 in heavy whipping cream held at 37 C. When strains of *S. aureus* were inoculated into milks and creams and held at 25 C, populations of the pathogen increased approx. 100-fold in skim and whole milk and 10-fold or less in light cream and heavy whipping cream. *S. aureus* was enumerated using Chapman Stone, Mannitol Salt, Baird-Parker and Vogel-Johnson agars. Best results were obtained with Baird-Parker and Vogel-Johnson agars, particularly when high-fat fluid products were tested. Milk fat content, incubation temp., and strain variation influenced the ability of *S. aureus* to grow in various dairy fluids. AS

393

Resmini (P), Pellegrino (L), Hogenboom (JA) and Andreini (R). **Thermal denaturation of whey protein in pasteurized milk. Fast evaluation by HPLC.** *Italian Journal of Food Science* 1(3); 1989; 51-62

Reversed phase HPLC of the isoelectric whey, on polymeric column and with fluorescence monitoring, has been applied to determine the extent of denaturation of whey protein in pasteurized milk. By means of industrial HTST pasteurization, carried out at temp. ranging from 72 to 90 C and holding times from 2 to 45 sec, isodenaturation curves versus heating time-temp. were obtained and compared with the denaturation values found in market milk samples processed under known conditions. The immunoglobulin denaturation, whose kinetics are reported, proved to be the best parameter for checking the processing conditions of pasteurized milk, even if low-heat treated. The peak area ratio (immunoglobulin + bovine serum albumin)/ β -lactoglobulin is useful for checking both the extent of denaturation of whey proteins in pasteurized milk without the availability of the raw milk, and for determining if the min. levels of soluble whey proteins specified by Italian law are being respected. AS

394

Addeo (F), Moio (L), Chianese (L) and Nota (G). **Evaluation of bovine and water buffalo milk in mixtures of liquid milk and Mozzarella cheese by gel isoelectric focussing.** *Italian Journal of Food Science* 1(3); 1989; 71-80

A method for the detection of bovine milk in water buffalo milk and in Mozzarella cheese has been developed. The method consists of (1) the *in vitro* formation of γ 2- and γ 3-caseins by the addition of plasmin to cheese or casein solution; (2) their

subsequent detection by polyacrylamide gel isoelectric focusing in the pH range of 5 - 8; (3) a densitometric evaluation of the electrophoretic bands. The procedure allows for a simultaneous estimation of bovine and water buffalo milk quantities in milk or cheese in amounts as low as 1% of the added milk. The level of adulteration was determined either by using a calibration plot established by analysing cheese samples containing known amounts of milk from the two species or by calculating the ratio of bovine γ 2-casein to the total γ 2-caseins. This method has been found to give reliable results even in the case of cheese stored for several days at room temp. AS

395

Grover (S), Batish (VK) and Srinivasan (RA). **Production and properties of crude enterotoxin of *Pseudomonas aeruginosa*.** *International Journal of Food Microbiology* 10(3/4): 1990: 201-208

Pseudomonas aeruginosa CTM-3 was found to be the most potentially enterotoxigenic strain out of the 12 isolates recovered from milk, as a high fluid length ratio, i.e. F/L (1.1) in rabbit gut and a strong permeability response in rabbit skin (38.5 mm² necrotic zone) was obtained with this culture. No clear-cut relationship between the two tests was observed. Six of the ethidium bromide (300 µg/ml) cured variants of this culture completely lost their ability to produce enterotoxin indicating the possible involvement of a plasmid in enterotoxin synthesis. The crude enterotoxin from *P. aeruginosa* CTM-3 was completely inactivated in 15 sec at 72 C. However, it was fairly stable at pH values in the range 4.5 - 7.5. Both pepsin and trypsin inactivated the enterotoxin activity at a concn. of 40 µg/ml. Organic acid, formalin and hydrogen peroxide had no significant effect on the enterotoxin activity. The need for further investigations with purified preparations is emphasized. AS

396

Misra (AK) and Kuila (RK). **The selection of bifidobacteria for the manufacture of fermented milks.** *Australian Journal of Dairy Technology* 46(1): 1991: 24-26

Three strains of *Bifidobacterium bifidum* strains isolated from the stools of infants fed breast milk exclusively, and 4 standard strains of the same organism (NCDO 1452, NCDO 1453 and NCDO 1454 of UK and NDRI Karnal, India) were examined for their suitability in the manufacture of fermented milks. On the basis of dietetic criteria, *B. bifidum* strains NCDO 1452, NCDO 1454 and NDRI would be the most suitable for fermented milk manufacture. When both dietetic and technological

criteria are considered, NDRI strain is the best for manufacture of *B. bifidum* based fermented milks. GS

397

Mittal (SB), Newell (G), Hourigan (JA) and Zadow (JG). **The effect of protease contamination in lactase on the flavour of lactose-hydrolyzed milks.** *Australian Journal of Dairy Technology* 46(1): 1991: 46-47

This paper deals with the levels of protease contamination in commercial lactases, variability in commercial preparations and effect on flavour of recombined milk. BV

Milk products

398

Goyal (GK). **Practice and research related to packaging of indigenous dairy products - a review.** *Indian Dairyman* 43(11): 1991: 489-492

This review article briefly covers aspects like functional packaging, research on dairy packaging, popularity of indigenous dairy products, packaging practice and packaging research done on milk based sweetmeats and fermented dairy products. SRA

399

Johnson (EA), Nelson (JH) and Johnson (M). **Microbiological safety of cheese made from heat-treated milk. Part I. Executive summary, introduction and history.** *Journal of Food Protection* 53(5): 1990: 441-452

400

Smith (LB), Zottola (EA), Fox (TL) and Chausse (K). **Use of PetrifilmTM to evaluate the microflora of frozen dessert mixes.** *Journal of Food Protection* 52(8): 1989: 549-551

Ninety vanilla frozen dessert mix samples were analyzed to determine total microbial populations and coliforms present in samples inoculated with a coliform isolated from raw milk. Standard methods agar (SMA, PCA, Difco) and violet red bile agar (VRBA, Difco) as well as PetrifilmTM (PSM, PVRB) were used for plating of samples. Standard VRBA 1:10 method produced significantly higher counts of colony forming units (CFU) than PVRB 2:3 and VRBA 2:3 methods. VRBA 2:3 CFU counts were also significantly higher than those on PVRB 2:3, but both methods showed a moderately strong linear relationship. Repeatabilities of all three coliform plating methods (VRBA 1:10, VRBA 2:3 and PVRB 2:3) were acceptably low. Less than 10% of samples plated on SMA and PSM resulted in total aerobic

CFU in the countable range, making evaluation of data difficult and resulting in a lack of strong linear relationship between PSM and SMA. An additional 70 local retail store samples containing naturally occurring coliforms were evaluated using PVRB 2:3 and VRBA 1:10 methodology, confirmed in brilliant green lactose bile broth (BGLB, Difco) and compared to standard VRBA 1:10 previously analyzed. All methods were equivalent for mean log coliforms, i.e., 1.38, 1.33 and 1.31 for PVRB 2:3, VRBA 2:3 and VRBA 1:10, resp. PetrifilmTM methods were comparable to standard methods for enumerating coliforms in frozen dairy products, and would be a valid alternative to standard coliform and total plate count methods. AS

Butter

401
Wadhwa (BK), Surinder Kaur and Jain (MK). **Enhancement of the shelf-life of flavoured butter oils by synthetic antioxidants.** *Journal of Food Quality* 14(2): 1991: 175-182

The shelf-life of flavoured butter oils was significantly enhanced by BHA, BHT both at 0.02% level and TBHQ at 0.005% level. SD

Cheese

402
Ganguli (NC). **Cheese base - a base for new foods in its own right.** *Indian Dairyman* 43(10): 1991: 449-451

Cheese base is a stable form of young cheese solids with the same comp. and functional properties as young Cheddar cheese. It is used as a substitute for young cheese in processed cheese upto 50% of the blend in making processed cheese. The advantage of the cheese base is that the yield is at least 16% higher compared to traditional cheese made from the same amount of milk. This paper reviews the principle steps involved in the manufacture of cheese base, characteristics, and properties of cheese base. SRA

403
Sinha (AK) and Ranjan (KS). **A report of mycotoxin contamination in Bhutanese cheese.** *Journal of Food Science and Technology (India)* 28(6): 1991: 398-399

Nine dominant fungi were isolated from 19 samples of cheese obtained from Bhutan. The incidence of *Aspergillus ochraceus* was max. (74%) followed by *Penicillium citrinum* (68%). Twelve of the 19 cheese samples were found to be contaminated with

different levels of mycotoxins. Citrinin was detected in max. number of cheese samples (6), either alone or as co-contaminant with ochratoxin A. Three samples of cheese were also contaminated with aflatoxins. AS

404
Hodgson (R). **Marketing speciality cheese to the consumer.** *Journal of the Society of Dairy Technology* 43(4): 1990: 96-98

Mozzarella cheese

405
Jana (AH) and Upadhyay (KG). **The effects of homogenization conditions on the textural and baking characteristics of buffalo milk Mozzarella cheese.** *Australian Journal of Dairy Technology* 46(1): 1991: 27-30

Homogenization of buffalo milk at 25 or 50 kg/cm² pressure and 50 C temp. resulted in Mozzarella cheeses which were superior to controls with regard to flavour and fat leakage, but inferior in stringiness, textural properties (hardness, cohesiveness, springiness, gumminess and chewiness) and meltability of the cheese. GS

Paneer

406
Singh (L), Murali (HS) and Sankaran (R). **Extension of shelf-life of paneer by sorbic acid and irradiation.** *Journal of Food Science and Technology (India)* 28(6): 1991: 386-388

Paneer, an acid and heat coagulated milk product, is highly perishable because of high moisture (58 - 60%) and low acidity (pH 5.6 - 5.8). The product had 430 total plate count, 120 proteolytic bacteria, 170 lipolytic bacteria and 40 fungi/g of sample with a shelf-life of few hr. Treatment with sorbic acid and/or gamma irradiation reduced the microbial load. Combination treatment of 0.10% sorbic acid in milk and irradiation of the product at 2.5 kGy preserved the paneer for 30 days at ambient temp. (25 - 35 C) with good acceptance. AS

Sandesh

407
Sen (DC) and Rajorhia (GS). **Production of Narampak sandesh from buffalo milk.** *Journal of Food Science and Technology (India)* 28(6): 1991: 359-364

The technology of *narampak sandesh* production from buffalo milk with reference to its sugar level, fat content in milk and the method of heating during cooking was standardised. On the basis of sensory evaluation, best results were indicated with the use of 30% crystalline cane sugar and 4% fat in milk. For a good quality *sandesh* preparation, slow process of heating was essential. Addition of *channa* in two instalments markedly improved the body and texture of the finished product. Chemical and microbiological results obtained would be useful in formulating the standards of *narampak sandesh*. AS

Shrikhand

408

Prajapati (JP), Upadhyay (KG) and Desai (HK). **Study on the influence of post-production heat treatment on quality of fresh shrikhand.** *Journal of Food Science and Technology (India)* 28(6): 1991; 365-367

The post-production heat treatment of shrikhand had no adverse effect on its av. comp., titratable acidity, pH, precipitated protein, syneresis, flavour, body and texture characteristics. There was slight improvement in the consistency of the product. It had a marked destructive effect on groups of microorganisms studied depending in severity of heat treatment and the type of microorganisms involved. AS

Wheys

Whey protein concentrates

409

Williams (TV), Versteeg (K) and Houlihan (AV). **The effect of pasteurisation of cheese milk and whey on the major lipid components of whey protein concentrates.** *Australian Journal of Dairy Technology* 46(1): 1991; 36-39

Pasteurisation of cheese milk and whey affected the amount and composition of whey protein conc. (WPC) lipids. Pasteurisation of milk increased the proportion of phospholipids and reduced the neutral lipid fraction. GS

Yoghurts

410

Balasubramanyam (BV) and Satish Kulkarni. **Standardisation of manufacture of high fat yoghurt with natural fruit pulp.** *Journal of Food Science and Technology (India)* 28(6): 1991; 389-390

Yoghurt made from milk with 8% sugar and homogenised at 200 bar pressure was found to be of good quality. Addition of mango pulp upto 4% of milk marginally improved the flavour characteristics. Addition of mango pulp higher than 4% affected the delicate yoghurt flavour and also the body and texture characteristics irrespective of homogenisation pressure. Homogenisation at higher pressure was observed to reduce the whey separation and also resulted in smoother consistency. Addition of mango pulp increased the softness and syneresis of yoghurt. Homogenisation at 200 bar pressure was observed to improve the consistency, water holding capacity and also the sensory characteristics. The Penetration value (PV) and syneresis were observed to decrease with the increase in the homogenisation pressure. AS

MEAT AND POULTRY

Meat

411

Bastos (DHM) and Areas (JAG). **Lung proteins: Effect of defatting with several solvents and extrusion cooking and some functional properties.** *Meat Science* 28(3): 1990; 223-235

Dried lung defatted with several solvents was texturized by extrusion cooking. The emulsifying capacity, water absorption capacity (WAC), and protein solubility, at different pH and $MgCl_2$ concn., of this material were determined prior to and after extrusion, as well as the texture profile analysis of the rehydrated extrudates. Solubility profile and emulsifying capacity of the lung proteins varies in relation to the solvent used in their defatting while the WAC was not affected. The extrusion of these materials promoted a higher solubilization of the protein fraction. The texture parameters of the extrudates studied and the solvent used to defat this material are related, indicating that the lipid-protein complex, left after solvent extraction, may play an important role in the texturization process of lung proteins. AS

412

Trout (GR). **The rate of metmyoglobin formation in beef, pork and turkey meat as influenced by pH, sodium chloride and sodium tripolyphosphate.** *Meat Science* 28(3): 1990; 203-210

This study investigated the effects of pH (5.5 to 7.0), NaCl concn. (0.0 - 3.0%), and sodium tripolyphosphate (STP) concn. (0.0 and 0.5%) on the

rate of metmyoglobin formation in ground beef, pork and turkey meat during refrigerated storage. Increasing the NaCl concn. produced a progressive increase in the rate of metmyoglobin formation in ground beef. Increasing the pH between pH 5.5 and 6.5 had no effect on the rate of metmyoglobin formation with ground beef and turkey meat, but produced a marked decrease between pH 6.5 and 7.0. In contrast, pH had no consistent effect on the rate of metmyoglobin formation of ground pork and the rate of formation remained low at all pH levels. When ground beef contained 0.5% STP, the effect of pH was reversed and the rate of metmyoglobin formation was lowest at pH 5.5, increased as the pH increased to 6.5 and then plateaued. AS

413

Nortje (GL), Nel (L), Jordaan (E), Badenhorst (K), Goedhart (G), Holzapfel (WH), Grimbeek (RJ). **A quantitative survey of a meat production chain to determine the microbial profile of the final product.** *Journal of Food Protection* 53(5): 1990: 411-417

Microbial profile with reference to psychrotrophs, enterobacteriaceae, enterococci, micrococci, *Pseudomonas* spp. and *Brochothrix thermosphacta* was determined in samples from carcasses, personnel surfaces, equipment and minced meat, packaged and displayed in cabinets which were taken at a city abattoir, a wholesaler and to different supermarkets. The non-integrated production system of abattoirs, wholesalers and retailers yielded higher counts of enterobacteriaceae and micrococci. Besides psychrotrophs, the pseudomonads were the most numerous group in the final product. At the abattoir, the enterobacteriaceae and pseudomonads were the biggest contributors to the psychrotrophic count, at the wholesaler the enterobacteriaceae and micrococci counts and at the retailers the micrococci and pseudomonads, resp. This indicates that enterobacteriaceae might be common psychrotrophs in the meat production chain, may be originating from the abattoir and wholesale environments. BV

414

Trout (GR). **Prevention of colour defects in meat and meat products.** *Food Australia* 43(2): 1991: 52-56

Colour defects found in fresh meat (factors influencing discolouration rate), restructured meat products, cooked uncured meat products, cooked cured meat products (pale colour, fading during storage, green patches, surface greening and green

rings and cores) are discussed in this paper. Possible causes and suggestion for prevention of defects are also covered. SRA

415

Mann (N), Sinclair (A), Watson (M) and O'Dea (K). **Evaluation of rapid fat determination in meats using the CEM automated analyser.** *Food Australia* 43(2): 1991: 67-69

The study was conducted to compare the CEM rapid automated method for detn. of fat in meat with manual extraction technique. The automated technique consisted of integrated microwave moisture detn. and dichloromethane fat extraction. This method gave fat values 0.74% (absolute) lower than the manual method for beef, 0.46% lower for lamb, 0.74% lower for chicken, 0.70% lower for pork and 0.66% lower for all meats combined. As the total fat increased, the difference between the two techniques diminished. For low fat meats the difference between two methods was almost constant. The CEM method does not extract structural phospholipids quantitatively but provides rapid, quantitative extraction of triglycerides in meats. SRA

416

Gasser (U) and Grosch (W). **Aroma extract dilution analysis of commercial meat flavourings.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(6): 1990: 511-515

Eight commercial meat flavourings were compared by aroma extract dilution analysis (AEDA). The number of odorants appearing with significant FD factors varied greatly (8 - 33). Some odorants with a high FD factor in the aromagrams of broths prepared from beef and chicken meat also appeared in the aromagrams of the flavourings, e.g. bis(2-methyl-3-furyl)disulphides, the character impact compound for the "meaty" flavour note. Other compounds, e.g. 2-methyl-3-(methylthio)-furan appeared with a significant FD factor only in the aromagrams of the flavourings. The results indicate that AEDA is a suitable technique for characterizing commercial food flavourings. AS

417

Virgili (R) and Parolari (G). **Quality control in the meat industry by multivariate statistics. The case of raw ham.** *Meat Science* 29(1): 1991: 83-96

418

Tibin (IM) and Melton (CC). **Some microbiological assays of ground beef blended with hydrogenated soybean oil.** *Meat Science* 28(3): 1990: 245-249

Ground beef patties were formulated from beef lean, beef fat and hydrogenated soybean oil. Using the Pearson Square Method, the patties were formed to contain three total fat levels (16, 20 and 24%). At each level, vegetable fat was substituted for 0, 25 or 50% of total fat to end up with nine different blends. Aerobic psychrotrophs and mesophiles of the blends were investigated at 0-, 3-, 6-day intervals. A split-split plot design with two replication was used to differentiate significant and non-significant attributes of the main effect and the corresponding interactions. Results obtained show that total fat level, percentage vegetable fat or replication did not have a significant effect on bacterial numbers of ground beef extended with hydrogenated soybean oil of 70 iodine value. However, the days of storage significantly ($P < 0.001$) affected both the Standard Plate Count (SPC) and Psychrotrophic Plate Count (PPC). The log number of bacteria in both SPC and PPC was found to be higher than SPC, which indicates that the predominant microflora in raw beef products is psychrotrophic in nature. AS

419

Lewis (GJ) and Purslow (PP). **Connective tissue differences in the strength of cooked meat across the muscle fibre direction due to test specimen size.** *Meat Science* 28(3): 1990: 183-194

Systematic variations in the tensile strength of cooked beef *M. semitendinosus* across the muscle fibre direction due to the cross-sectional size of specimens are demonstrated in specimens from (a) longitudinal and (b) transverse slices. The strength perpendicular to the fibre direction of longitudinal slices of thickness 0.25 - 5.75 mm varied by a factor of 2, thicker slices being stronger. This factor of 2 is in approximate agreement with the difference in strength of transverse versus longitudinal slices across the fibre direction. These variations of strength due to specimen geometry are explained on the basis of the increasing likelihood of including a ribbon of the perimysial connective tissue network which is continuous along the whole length of the test piece in larger samples. The breaking strength of small cross-sectional area specimens is likely to be dominated by the strength of the endomysial-perimysial junction. Larger cross-sectioned specimens, by including continuous strands of the perimysial network, have higher strengths resulting from the necessity to break these strands. These findings highlight the need to specify

specimen dimensions in tensile test results. They also show that by manipulating specimen geometry, the relative magnitude of the two mechanisms of connective tissue fracture (endomysial-perimysial separation and perimysial strand fracture) may be assessed. AS

420

Smith (JJ), Ockerman (HW) and Plimpton (RF). **The effect of cooking temperature, holding temperature and holding time on proximate analysis, aerobic plate count and coliform count on restructured beef roasts.** *Journal of Food Protection* 53(5): 1990: 396-399

421

Vanderwert (W), Bechtel (PJ), DeVol (DL), McKeith (FK), Berger (LL), Shanks (RD). **Factors related to longissimus tenderness among alternate methods of lean beef production.** *Journal of Food Quality* 12(6): 1989: 445-453

422

Oellingrath (IM), Iversen (A) and Skrede (G). **Quantitative determination of myoglobin and haemoglobin in beef by high performance liquid chromatography.** *Meat Science* 28(4): 1990: 313-320

423

Leonard (SM) and Larick (DK). **Effect of vacuum-packaged frozen storage, after cooking, on the phospholipids of hereford and bison.** *Meat Science* 28(4): 1990: 299-311

424

Bernthal (PH), Booren (AM) and Gray (JI). **Effect of reduced sodium chloride concentration and tetrasodium pyrophosphate on pH, water-holding capacity and extractable protein of prerigor and postrigor ground beef.** *Meat Science* 29(1): 1991: 69-82

425

Sheard (PR), Jolley (PD) and Rush (PAJ). **Effect of temperature on the particle size distribution of flake-cut meat.** *International Journal of Food Science and Technology* 26(2): 1991: 199-205

Bovines

426

van Laack (RLJM) and Smulders (FJM). **Colour stability of bovine Longissimus and Psoas major muscle as affected by electrical stimulation and hot boning.** *Meat Science* 28(3): 1990: 211-221

427

Babiker (SA), El Khider (IA) and Shafie (SA). **Chemical composition and quality attributes of goat meat and lamb.** *Meat Science* 28(4): 1990; 273-277

Chemically, goat meat had significantly ($P < 0.05$) less intramuscular fat and significantly ($P < 0.001$) more moisture than lamb. The sarcoplasmic protein concn. of the goat meat was significantly ($P < 0.001$) greater than that of lamb while the myofibrillar protein concn. was similar in the two species. Goat meat was darker red in colour than lamb. It had significantly ($P < 0.001$) superior water-holding capacity and less cooking losses than lamb. Meat flavour was significantly ($P < 0.05$) less strong in goat meat than in lamb. AS

Ewes

428

Mahendrakar (NS), Dani (NP), Ramesh (BS) and Amla (BL). **Effect of post-mortem conditioning of ewe carcasses on instrumental texture profile of cooked thigh muscles.** *Meat Science* 28(3): 1990; 195-202

The semimembranosus (SM) and semitendinosus (ST) muscles were removed from 18 four to five yr old Bannur breed ewes which were slaughtered and carcasses (six each) suspended by the (a) Achilles tendon at 26 plus or minus 2 C for 1 h before cutting (b) Achilles tendon at 2-3 C for 24 h and (c) Pelvis at 26 plus or minus 2 C for 7 h followed by chilling at 2-3 C for 17 h. The muscles were cooked by boiling in a water bath for 30 min or by heating in a pressure cooker for 20 min and the tenderness measured with a Warner-Bratzler tenderometer. Hardness, cohesiveness, elasticity and chewiness were also measured with a General Foods Texturometer. With conventional hanging at 2-3 C the SM muscle was the toughest and the ST muscle the most tender. By holding carcasses at 26 plus or minus 2 C for 1 h before cooking there was an increased tenderness. The most tender meat was found from carcasses which were suspended by the pelvis at 26 plus or minus 2 C before chilling. The increase or decrease in shear values were resp. associated with contraction or stretching of muscles effected by carcass conditioning treatments. In contrast, thermal shrinkage due to cooking had opposite effects so that greater thermal shrinkage resulted in lower shear values. The shear values from the Warner-Bratzler tenderometer did not correlate well with the parameters measured by the General Foods Texturometer. AS

429

Moore (VJ). **Increase in retail display of frozen lamb chops with increased loin storage time before cutting into chops.** *Meat Science* 28(3): 1990; 251-258

There is a steady deterioration of the colour of lamb chops during frozen storage. Storing meat in carcass form or as primals before cutting and packaging minimizes the exposure of the meat surfaces to deteriorating environmental effects. This experiment examines the effects of storage conditions (form, time and temp.) on the display life of frozen chops. Loins were removed from recently frozen carcasses and stored for 0, 10, 20 or 30 wks at temp. of -5 C, -10 C and -20 C. Chops were cut from the stored loins, packaged in oxygen permeable film, stored in the dark at -20 C for 0, 4, 8 or 12 wks and then displayed at -20 C under continuous lighting. The retail display life of the chops was assessed by an experienced colour panel. The most rapid colour deterioration occurred in chops cut from unstored frozen loins and held for 12 wks prior to display (display life of less than 1 day). Chops cut from loins stored for 30 wks at -20 C, and then held for 12 wks prior to display had a display life of 23 days. Both increased loin storage temp. and an increased duration of chop storage before display decreased the retail display life. This study indicates that frozen storage of cut chops for as little as 4 wks reduces the display life by almost 80% so that whole carcasses or loins rather than cut chops should be shipped to distant markets. AS

Sheep

430

Aalhus (JL) and Price (MA). **Endurance - exercised growing sheep: I. Post-mortem and histological changes in skeletal muscles.** *Meat Science* 29(1): 1991; 43-56

A study was conducted with Suffolk ram lambs to determine whether chronic endurance exercise would affect post-mortem changes in muscle tissue. Muscle fibre diameters, sarcomere lengths, fibre types, and pH and temp. declines were measured in five skeletal muscles (semimembranosus, SM; vastus lateralis, VL; semitendinosus, ST; psoas major, PM; gastrocnemius, G). The exercise had no significant effect on muscle size or muscle fibre diameter in any of the muscles studied. However, endurance-exercised sheep had significantly shorter sarcomeres in all five muscles than their non-exercised counterparts. The pH decline curves differed among muscles; those having the highest proportion of glycolytic fibers had the

slowest rates of pH decline. The increased proportion of slow-twitch fibres in the SM, VL, ST and G associated with the exercise regime had little effect on the post-mortem pH decline. However, the ST also had a significant exercise-associated increase in the proportion of the oxidative-glycolytic fibres (intermediate) and was the only muscle in which exercise influenced the rate of pH decline significantly. AS

431

Aalhus (JL), Price (MA), Shand (PJ) and Hawrysh (ZJ). **Endurance - exercised growing sheep: II. Tenderness increase and change in meat quality.** *Meat Science* 29(1): 1991: 57-68

A study was conducted to examine the effect, in ram lambs, of chronic treadmill exercise, on meat quality. A secondary objective was to relate changes in tenderness to metabolic and chemical phenomena. Meat quality traits, including instrumental measurement of tenderness and thaw and drip losses, were recorded for two muscles from the hind limb (semimembranosus, SM; vastus lateralis, VL). Chemical analyses, including total and soluble collagen, total and myofibrillar protein, and myofibrillar fragmentation were also performed. Muscles from exercised sheep were significantly more tender than muscles from their control counterparts. A larger myofibrillar protein to total collagen ratio was observed in the VL muscles from exercised sheep ($P < 0.01$) which probably contributed to the observed increase in tenderness. However, similar results were not observed for the SM muscle. The tendency for a slightly higher pH at similar post-mortem temp. in meat from exercised sheep may also have contributed to the increased tenderness. AS

Pork

432

Sheridan (JJ), Walls (I) and Levett (PN). **Development of a rapid method for enumeration of bacteria in pork mince.** *Irish Journal of Food Science and Technology* 14(1): 1990: 1-15

433

Jones (SDM), Greer (GG), Jeremiah (LE), Murray (AC) and Robertson (WM). **Cryogenic chilling of pork carcasses. Effects on muscle quality, bacterial populations and palatability.** *Meat Science* 29(1): 1991: 1-16

Pigs

434

Prusa (KJ), Love (JA) and Miller (LF). **Composition and sensory analysis of rib chops from pigs supplemented with porcine somatotropin (pSt).** *Journal of Food Quality* 12(6): 1989: 455-465

435

Prusa (KJ), Love (JA) and Miller (LF). **Composition, water-holding capacity and pH of muscles from pigs supplemented with porcine somatotropin (pSt).** *Journal of Food Quality* 12(6): 1989: 467-474

Sow

436

Cordray (JC), Huffman (DL) and Egbert (WR). **Restructured pork from hot-processed sow-meat: Effect of particle size and blend ratio.** *Journal of Food Protection* 52(8): 1989: 581-585

Products

437

Wedzicha (BL) and Mountfort (KA). **Reactivity of sulphur dioxide in comminuted meat.** *Food Chemistry* 39(3): 1991: 281-297

Poultry

438

Izat (AL), Driggers (CD), Colberg (M), Reiber (MA) and Adams (MH). **Comparison of the DNA probe to culture methods for the detection of Salmonella on poultry carcasses and processing waters.** *Journal of Food Protection* 52(8): 1989: 564-570

In a series of 5 experiments a total of 269 broiler carcass and chill tank water samples were tested for the presence of *Salmonella* using the DNA probe and the standard cultural method. Carcasses were sampled using a whole carcass rinse technique. Samples consisted of pre-chill (48) and post-chill (103) carcasses, and pre-chill (48) and chill (70) tank water. Samples to be evaluated with the DNA probe were subjected to three preenrichment/enrichment procedures to determine the most accurate and reliable enrichment procedure to use with the DNA probe assay. Direct enrichment in Selenite Cystine followed by 24 h incubation in Gram Negative broth allowed for recovery of 0.03 salmonellae/ml from carcass rinse and from pre-chill water using either the standard cultural method or the DNA probe. Pre-enrichment in lactose broth produced inaccurate results for prechill carcass and pre-chill water samples using the DNA probe assay, and may be due to extreme microbiological competition. No false positive results were obtained using the DNA probe assay for any of the four sample types. AS

439

Kesava Rao (V), Ravindra Sharma and Kowale (BN). **Preservation of chicken meat by freezing.** *Poultry Guide* 28(11): 1991: 25-30

Still air freezing, blast freezing, liquid or brine freezing, freezing with liquified gases and plate freezing are some methods which could be employed for freezing poultry meat and a comparison has been made of these. The factors influencing the rate of freezing such as the size and shape of the package; size and shape of the product; the medium in which the foods are packed; quantity food frozen; and packaging material used have been described. To achieve rapid freezing turbo-chills are used to allow fast moving air. Several qualitative changes in carcass colour, tenderness and flavour, bone taint during freezing and these have been reviewed. 18 references. GS

440

Thind (SS), Bawa (AS), Kashmira Singh and Pardeep Sharma. **Effect of supplementing poultry meat with textured soy on the quality of loaves.** *Journal of Food Science and Technology (India)* 28(6): 1991: 394-395

The chicken meat loaves were prepared from culled hens and broiler breeder males using minced meat in combination with various levels of textured soy (TS). The TS was incorporated at levels of 10, 20, 30, 40 and 50% of the meat. The sensory evaluation revealed that loaves containing TS upto 30% level were acceptable. The broiler samples were preferred to hens but the preference was not significantly different. The loaves had a shelf-life of about 12 days at refrigeration temp. AS

Quails

441

Prabhakar Reddy (K), Narahari (D) and Kumara Raj (K). **Effect of polyphosphate chilling on the quality of quail meat.** *Journal of Food Science and Technology (India)* 28(6): 1991: 368-370

Spent Japanese quails (240) with equal number of males and females were dressed and chilled in 3 and 6% sodium tripolyphosphate (STPP) solution. The chilled carcasses were stored at 4 plus or minus 1 C for 6 days and at - 18 plus or minus 1 C for 60 days and evaluated microbiologically and for sensory qualities. Both the levels of STPP treatment retarded the growth of aerobic mesophilic counts and psychrophilic bacteria on the surface of quail carcasses during 60 days of frozen storage. STPP

treatment has improved all the sensory characteristics. Chilling for 6 h gave better scores for colour, appearance, and flavour. In general, fresh quail carcasses, females and breast muscle gave better sensory scores than their counterparts. AS

Poultry products

442

Kondalah (N) and Panda (B). **Relevance of poultry products technology for poultry industry development.** *Poultry Guide* 28(10): 1991: 21-31

This exhaustive review covers processing, storage, marketing and utilization of poultry meat and its products. The speciality of poultry meat is indicated and the methods to increase the demand for poultry products has been outlined. Stabilization of the market price is one of the key factors. A var. of products that could be prepared and the methodology of product development has been indicated. The quality expected from the poultry meat and the process of deboning and the various parameters that affect the quality have been tested. Methods of utilization of spent hens (culls), advantages in the incorporation of poultry meat in mutton products, and the possibility of preparing enrobed (coated) products have also been outlined. Proper packaging so as to have proper shelf life during distribution and home storage is also essential aspects which are briefly illustrated. A brief mention is also made about eggs and egg products including the increasing trend noted in egg consumption in India and also the need for stabilization of egg prices throughout the yr. AS

Eggs

Egg white

443

Anon. **Whipping agent replaces egg white.** *Prepared Foods* 160(3): 1991: 62

An egg white replacer which is low in sodium, cholesterol-free, *Salmonella* free and which contains high levels of soluble fibre and carbohydrates has been produced. This ingredient can be stored at room temp. and food products made with it do not stale quickly. GS

444

Gopakumar (K). **Major marine products for export - fresh, frozen and value added from India.** *Seafood Export Journal* 23(8): 1991: 11-16

The major marine products exported from India constitute frozen shrimp (block and individual quick frozen (IQF)), frozen lobsters, frozen squid, and cuttle fish. The quantity of individual products exported, their processing methodology, and the packaging system adopted are the aspects covered in this review. SRA

445

Lovell (RT). **Foods from aquaculture.** *Food Technology* 45(9): 1991: 87-92

The purpose of this report is to introduce the concept of aquaculture for food production, its evolution and benefits, the species cultured such as marine shrimp, channel catfish, rainbow trout, salmon, crawfish, tilapia, carp and marine fish. The nutritional values (the caloric value, the protein percentage, the fatty acid composition and the n-3 HUFA composition) of fish, the quality of the products, the market forms and the future of aquaculture products are covered in this article. CSA

Crabs

446

Ingham (SC) and Moody (MW). **Enumeration of aerobic plate count and *E. coli* during blue crab processing by standard methods, PetrifilmTM, and RedigelTM.** *Journal of Food Protection* 53(5): 1990: 423-424

Mussels

447

Luckas (B), Thielert (G) and Peters (K). **The problem of the selective determination of PSP-toxins in mussels.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(6): 1990: 491-495 (De)

Levels of paralytic shellfish poisoning (PSP) toxins in shellfish are routinely determined by mouse bioassay. In order to improve the qualitative and quantitative detn. of PSP toxins, chromatographic techniques with fluorescence detection have been developed. These HPLC methods and the HPLC/MS coupling were used to determine a second PSP toxin which was found, in addition to saxitoxin, in canned

Spanish mussels. These canned mussels were rejected in 1986 by the German food control because PSP concn. were too high. It has been shown that these samples contained mainly de-saxitoxin. AS

Prawns

448

Nirmala Thampuran and Gopakumar (K). **Microbial profile of tropical prawn *Metapenaeus dobsoni* during frozen storage.** *Journal of Food Science and Technology (India)* 28(6): 1991: 371-374

Microbiological changes of Indian prawn, *Metapenaeus dobsoni* frozen as whole (W) headless-shellon (HL) and peeled and deveined (PD) were investigated. Exposure to freezing temp. caused mortality of major bacteria present in prawn. 83.67%, 79.48% and 52.90% of cells being destroyed in W, HL and PD types. Frozen storage for a period one month caused less destruction (13.58%, 16.90% and 9.78%). After two months, death was very slow and gradual. The results point to a difference in the survival rate of bacteria present on PD prawn. Qualitatively, various genera were affected differently by freezing and frozen storage. *Vibrio* spp. were the most sensitive and *Micrococcus* spp. the most resistant. AS

Scallops

449

Chung (SL) and Merritt (JH). **Physical measures of sensory texture in thawed sea scallop meat.** *International Journal of Food Science and Technology* 26(2): 1991: 207-210

An instrumental method of texture measurement for scallop (*Placopecten magellanicus*) meats after frozen storage has been developed to replace the sensory method. Non-destructive and destructive compressive forces at 50 and 80% deformation resp. and shear peak force gave significant correlation coeff. of 0.89, 0.78 and 0.82 resp. with sensory evaluation of the cooked meats. The coeff. of variation associated with the compression method was smaller, however, than with the shear method. AS

Shrimps

450

McEvily (AJ), Radha Iyengar and Otwell (S). **Sulphite alternative prevents shrimp melanosis.** *Food Technology* 45(9): 1991: 80, 82-86

Trials were conducted on brown shrimp (*Penaeus aztecus*) and pink shrimp (*P. duorarum*) to evaluate

the functionality of 4-hexylresorcinol as a processing aid for the inhibition of shrimp melanosis (shrimp blackspot) with dips using small test units. The shrimp samples were dipped into 1 L of various test solutions consisting of sea water (final pH 7.5 to 8.0; salinity 3.5%), 1.25% sodium metabisulphite and 50 p.p.m. 4-hexylresorcinol at ambient temp. for 1 min. Following the dip, the shrimps were drained and stored on crushed ice for 12 days and then the development of shrimp melanosis was evaluated. The results of the study focusses on the effective concn. of 4-hexylresocinol, the amount of shrimp that can be processed with a single dip solution and the residuals on shrimp meat. The implications of these results are discussed in this article specifying that 4-hexylresorcinol is the most effective resorcinol derivative tested to date for the inhibition of shrimp melanosis. CSA

Fish

451

Karunasagar (I) and Indrani Karunasagar. **Harvest and post-harvest microbiology of fishes.** *Indian Journal of Microbiology* 31(3): 1991: 211-229

An exhaustive review covering microbiology of fresh fish, effect of handling and icing on spoilage of fish, bacteria of public health significance in fish, bacteriological quality of fishes and its evaluation, and future research areas. Tabulated information is given on bacterial load in fishes from various regions of India, media used for enumeration of fish spoilage bacteria, distribution of *Clostridium botulinum* serotypes in tropical marine environments, pathogenic vibrios associated seafoods and microbiological tolerance limits for fresh fish in some countries. SRA

452

Taliat (JJ). **Domestic marketing of fishery products as support to export industry.** *Seafood Export Journal* 23(8): 1991: 26-29

Article briefly covers, fish consumption pattern in India, interstate flow of fish, modes of transportation, marketing intermediaries, price spread, demand for fish, and the supply position. Useful statistics on fish handling and consumption are given. SRA

453

Cronin (DA) and O'Sullivan (K). **Processed fish products as sources of n-3 polyunsaturated fatty acids.** *Irish Journal of Food Science and Technology* 14(1): 1990: 17-24

The role of the n-3 polyunsaturated fatty acids (PUFAs) of fish oils in alleviating the symptoms of coronary heart disease (CHD) is now well recognised. In this study, the flesh oil contents and the levels of n-3 PUFAs therein were used to assess the status of a range of popular processed fish products as sources of these compounds. Fat content was the most important determinant of n-3 PUFA status, with smoked whole fish providing the highest intake. While canned fish were more variable commodities, exhibiting a wider spread of fat levels, they were nevertheless a very good source of these acids, and on average, yielded about 2 g of the latter per 100 g of fish consumed. Significant amounts (24 - 49%) of n-3 PUFAs were partitioned into the canning medium for products canned in vegetable oils. Grilling of smoked whole fish was found to have no effect on n-3 PUFA levels in the extracted flesh oil. AS

454

Haaland (H) and Njaa (LR). **Effects of sodium nitrite and formaldehyde on the lysine content of fish muscle. Model experiments.** *Food Chemistry* 39(3): 1991: 337-345

Fish muscle pieces were treated under anaerobic conditions and at different pH values with sodium nitrite and formaldehyde alone and in combination. Lysine and tyrosine were the only amino acids affected under the conditions chosen. Lysine was reduced by some 20% by nitrite alone and by nitrite and formaldehyde in combination at 24 h reaction time at pH 5.0, which was the lowest pH value tested. At higher pH values the effect was negligible. Formaldehyde had no effect on lysine. Tyrosine was not affected by nitrite, but formaldehyde alone and in combination with nitrite had a dose-related effect resulting in almost complete loss at the highest levels tested. This effect of formaldehyde was probably an artefact due to a reaction between tyrosine and formaldehyde during hydrolysis of the fish muscle pieces. AS

Cat fish

455

Ingham (SC). **Lactic acid dipping for inhibiting microbial spoilage of refrigerated catfish fillet pieces.** *Journal of Food Quality* 12(6): 1989: 433-443

Subdivided catfish fillets were dipped in chilled (7 C) solutions of 1.70% and 2.55% (v/v) lactic acid (LA) for 10 min. Control pieces were not dipped. All pieces were individually placed in sterile plastic bags and stored either at 7 C for 3 days or on ice in a 2 C cold room for 6 days. Aerobic plate count (APC) was periodically determined using plate count agar pour plate and PetrifilmTM SM film methods. At 7 C, APC

for both LA treatments was significantly ($P < 0.05$) lower than for controls during 3 days of storage. Day 3 APC values for 1.70% and 2.55% LA samples were lower than controls by 1.3 and 2.3 logs, resp. Similarly, after 6 days at 2 C the APC values for 1.70% and 2.55% LA samples were 1.3 and 3.1 logs lower, resp., than for control samples. Throughout storage at both temp., 2.55% LA samples had significantly ($P < 0.05$) lower APC than 1.70% LA samples. No significant ($P < 0.05$) difference was observed between pour plate PetrifilmTM APC methods, although APC values for the latter method were consistently slightly higher. Untrained sensory evaluation panelists could not consistently distinguish between control and 1.70% LA catfish pieces that were dipped in batter, breaded and fried. Control, 1.70% LA, and 2.55% LA-dipped pieces were not rated as significantly different ($P < 0.05$) in whiteness of flesh, tartness and overall flavour acceptability. Acid dipping of catfish could be useful for extending the refrigerated shelf-life of unfrozen catfish fillets. AS

Cod

456

Sych (J), Lacroix (C), Adambounou (LT) and Castaigne (F). **The effect of low- or non-sweet additives on the stability of protein functional properties of frozen cod surimi.** *International Journal of Food Science and Technology* 26(2); 1991: 185-197

The cryoprotective effect of low- or non-sweet additives, Palatinit^R, Polydextrose^R, casein hydrolysate and fish protein hydrolysate (8% w/w) as well as lactitol (at 4% and 8% w/w) were compared to an industrial control containing sucrose/sorbitol (8% w/w) and a control without additive in cod surimi stored at -20 C for 4 months. Freeze-induced protein denaturation was evaluated monthly by salt extractable protein and differential scanning calorimetry analyses of surimi followed by texture and expressible moisture analyses of surimi cooked gels. Results revealed that protein functionality was similarly maintained during frozen storage by lactitol, Palatinit⁴ and Polydextrose^R when incorporated in cod surimi at the 8% level. Surimi gels could be produced with textural attributes comparable to 8% w/w sucrose/sorbitol surimi gels, and the level of lactitol in cod surimi could be reduced at 4% w/w without significant alteration of cryoprotection. Some benefits in gel-forming properties were obtained by adding 8% casein hydrolysate to cod surimi. AS

Ray fish

457

Pastoriza (L) and Sampedro (G). **Loss of urea from the flesh of ray (*Raja radiata*) during the canning process.** *International Journal of Food Science and Technology* 26(2); 1991: 211-213

Cooking frozen ray in water or in steam, followed by canning in brine reduced the urea content of the muscle 4 - 5 fold. BV

Trout

458

Sato (K), Ohashi (C), Ohtsuki (K) and Kawabata (M). **Type V collagen in trout (*Salmo gairdneri*) muscle and its solubility change during chilled storage of muscle.** *Journal of Agricultural and Food Chemistry* 39(7); 1991: 1222-1225

Post-mortem changes of type I and V collagens in rainbow trout muscle were examined in relation to the softening of fish muscle during chilled storage. Degradation of helical regions of collagens was not detected. On the other hand, the solubility of type V collagen increased significantly, while that of type I collagen did not change. These facts suggest that degradation of nonhelical regions or intermolecular cross-links occur preferentially in type V collagen. AS

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

459

Loyola (E), Martin-Alvarez (PJ), Herraiz (T), Reglero (G) and Herraiz (M). **A contribution to the study of the volatile fraction in distillates of wines made from Muscat grapes (Pisco).** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 190(6); 1990: 501-505

The use of a programmed temp. vapourizer, operated in the solvent split mode, was evaluated in order to eliminate the concn. step required to analyze aroma extracts. Volatile constituents of Pisco, a distillate of wines made from Muscat grapes, were quantified and principal component analysis and cluster analysis were applied to the data obtained. AS

Cantarelli (C). **The use of immobilized yeasts in wine fermentation.** *Italian Journal of Food Science* 1(3); 1989; 3-20

Ethanol fermentation with immobilized yeast has been applied or proposed in a wide number of cases, including wine making. Specific applications include: must fermentation to obtain young, neutral white and rose wines as well as re-fermentation of various kinds of wines; production of sparkling wines; deacidification by malo-alcoholic fermentation; Sherry-like continuous "flor" processing. In this paper, the present knowledge about yeast immobilization methods, metabolic behaviour and processing conditions are reviewed, considering positive features and various constraints in terms of innovative possibilities for the wine industry. AS

Non-alcoholic beverages

Fruit juice

Muskmelon juice

461

Teotia (MS), Manan (JK), Berry (SK) and Sehgal (RC). **Beverage development from fermented (*S. cerevisiae*) muskmelon (*C. melo*) juice.** *Indian Food Packer* 45(4); 1991; 49-55

Muskmelon (*Cucumis melo*) juice extracted from fruits was unfit for table purpose. It was fermented by *Saccharomyces cerevisiae* for 96 h, cooled, filtered, filled in glass bottles, sealed and stored at room temp. (30 plus or minus 5 C). The fermented juice contained 6.5% (w/v) alcohol and possessed good sensory quality when adjusted to 10 and 12 degree brix with TSS; acid ratio of 34.5 and 41.4 resp. The ready-to-serve beverage prepared from this fermented juice contained 2.2% (w/v) alcohol and possessed excellent sensory quality at 12 degree Brix and TSS:acid ratio of 44.4 followed by 10 degree Brix and TSS:acid ratio of 37.3. The fermented juice could be stored upto 6 months at room temp. VKR

Tea

462

Mahajan (V), Arora (DS) and Sabherwal (U). **Antibacterial activity of some tea samples.** *Indian Journal of Microbiology* 31(4); 1991; 443-445

Antibacterial activity of Indian green and black tea (CTC and orthodox) tea against clinically important

Gram positive and negative bacteria has been tested. Aqueous extract of Japanese green tea was prepared by brewing in distilled water and the antibacterial activity was tested. Results showed that Gram positive and Gram negative bacteria were inhibited to varying extent. The former (*Staphylococcus aureus* and *Streptococcus faecalis*) were more sensitive than the latter. In general green tea was more effective than black tea. Green tea (Indian and Japanese) inhibited growth of *Klebsiella pneumoniae* while black tea was ineffective. *Enterobacter aerogenes* was sensitive only to Japanese green tea. Amongst black tea extracts orthodox tea was more inhibitory than CTC tea to *Pseudomonas aeruginosa* and *Shigella flexneri*. *Escherichia coli* was sensitive to all tea extracts. Bactericidal activity was apparent within 1 h; in *Salmonella typhi* viability was reduced to 0% within 2 h but in other organisms except in *P. aeruginosa* it reached 0% in 20 h. Overall results show that green tea was a better inhibitor of bacteria than black tea and Indian green tea extract is as effective as Japanese green tea extract in its antibacterial activity. SRA

463

Yamanishi (T), Botlheju (WS) and De Silva (MJ). **An index for assessing the quality of UVA seasonal black tea.** *Sri Lanka Journal of Tea Science* 58(1); 1989; 40-49

Studies of the methylene chloride extractable steam volatiles of seasonal black teas from UVA district showed that pentanal, (E)-2-hexenal, (Z)-3-hexenyl acetate, (Z)-3-hexenol, linalool oxide I, linalool oxide II, linalool, phenyl-acetaldehyde, (Z)-3-hexenyl hexanoate, nerol, methyl salicylate, geraniol, B-ionone/cisjasmone, nerolidol and indole are the main flavour contributing constituents found in the aroma complex. Analysis of the flavour profiles of teas obtained during the UVA flavour season from several estates in the UVA revealed the existence of a correlation between linalool/(E)-2-hexenal ratio and the prices they fetched at the tea auctions. The significance of employing this index in assessing the quality of seasonal teas from Sri Lanka is discussed. AS

464

Agarwal (B). **Factors affecting quality of tea during processing.** *Sri Lanka Journal of Tea Science* 58(1); 1989; 64-72

The factors affecting quality and flavour during manufacture of black tea as well as the overall influence of some other factors on tea manufacture have been discussed. AS

Sud (RG) and Badyal (J). **Varietal and seasonal variations in chemical constituents of tea (*Camellia sinensis* (L.) O. Kuntze) in Himachal Pradesh.** *Sri Lanka Journal of Tea Science* 58(1): 1989; 73-78

Varietal and seasonal variations in chemical constituents in 14 seed jats of tea were studied throughout four seasons during 1986 and 1987. Better quality teas were seen in the spring and summer seasons. The seed jats Dhoedham and Khorijan produced comparatively better quality teas followed by Kalline, Runglee and Doom Dooma under Palampur conditions. AS

Anandavijayan (S), Jayaweera (H) and Herath (NL). **Effect of sifting of dhool during fermentation on quality of manufactured black tea.** *Sri Lanka Journal of Tea Science* 58(2): 1989; 111-117

An investigation was carried out in the Talawakele region to find whether periodical sifting of dhools as opposed to the standard practice of non sifting could result in a better quality of tea. The results of this study revealed that teas manufactured in the normal manner produced better quality teas. AS

FATS AND OILS

Fats

Joglekar (MV), Momin (SA) and Subrahmanyam (VVR). **Butter-like products from indigenous hard fats.** *Journal of the Oil Technologists Association of India* 22(4): 1990; 70-72

Suitability of the hard fats as such and after subjecting them to interesterification reaction are reported for making butter-like products (BLP). Refined, bleached and deodourised sal fat (*Shorea robusta*) (SF) and mango (*Mangifera indica*) fats (MF) from industry and lab, refined and bleached kokum (*Garcinia indica*) fat (KF) and commercial coconut oil (CO) were used in the study, and found that a co-randomised blend of SF, KF and CO (60:30:10) gives good quality BLP. Alternatively, SF and liquid oil blends after interesterification can be hardened by blending directed interesterified SF with it. SF, MF and KF are closer to even distribution and are non-plastic; they are not suitable as such for making spreads; their randomised or co-randomised products which are more plastic can be used to get spreads of good quality BLP. By using the modified hard fats or their oleins, spreads having naturally

occurring unsaturated acids can be made, and hydrogenation can be totally avoided in the production of spreads and margarines. SRA

Oils

Walde (P) and Nastruzzi (C). **Application of a new, simple and economic colorimetric method for the determination of non-esterified fatty acids in vegetable oils.** *Food Chemistry* 39(3): 1991; 249-256

The amount of non-esterified fatty acids in 8 different vegetable oil samples has been determined by two different methods: (a) with a standard titration procedure, and (b) with a new colorimetric method which utilizes phenol red solubilized in reverse micelles. The results obtained by the two methods are in good agreement, although the standard deviation in the case of the phenol red method is significantly higher compared with the conventional titration. The main advantage of the new colorimetric method is an economic one: only small amounts of oil samples (less than 0.1 ml) are required and a comparably small amount of organic solvent (less than 5 ml isooctane) is needed. AS

Palm oils

Manorama (R) and Rukmini (C). **Nutritional evaluation of crude palm oil.** *Journal of the Oil Technologists Association of India* 22(4): 1990; 83-87

An evaluation was made of the nutritional consequences of feeding crude palm oil (CPO) to weanling albino rats Wistar strain, using refined groundnut oil (GNO) and refined palm oil (RPO) as controls. CPO and RPO had lower iodine values than GNO due to a higher % of saturated fatty acids. CPO had higher acid value and unsaponifiable matter than RPO. Palm oil is a saturated fat where palmitic and oleic acids predominate each around 42% with minor amounts of linoleic acid (10%) and trace of myristic acid. Nutritional study done for 28 days did not reveal difference in body wt. of animals fed these oils. Protein digestibility, dry matter digestibility, and NPU of the diets containing these fats were not different. No abnormality in liver and heart on 4 wk feeding of CPO was noted. Hematological parameters like RBC's, WBC's, packed cell volume and hemoglobin content did not show any significant difference between groups fed CPO, GNO and RPO. Organ wt. (liver, heart, kidney, ovary, testis, spleen and lung) of rats fed GNO, CPO and RPO for 4 wk did not show any change when dissected. Lipid profile of rats fed these oils for 90 days did not show any significant differences in

serum cholesterol levels, but triglyceride levels of CPO and RPO groups were higher than GNO. Crude palm oil did not show any adverse nutritional effects, and as a diet it is comparable with other commonly used edible oils. SRA

SPICES AND CONDIMENTS

Spices

470

Subbulakshmi (G), Shobha Udipi, Reshma Raheja, Arun Sharma, Padwal Desai (SR), Nair (PM). **Evaluation of sensory attributes and some quality indices of irradiated spices.** *Journal of Food Science and Technology (India)* 28(6): 1991: 396-397

Ground pepper, chilli, coriander, cumin, turmeric and a spice mix (sambar powder) exposed to an adsorbed dose of 10 kGy of gamma-irradiation were studied for microbial and sensory quality changes, if any, on storage for 3 months. No significant differences between the irradiated and non-irradiated samples could be observed in their sensory qualities. While no increase in microbial load in sealed irradiated samples could be observed, those that were irradiated but opened repeatedly for daily use did not show a marginal increase in microbial load. AS

Ginger

471

Mantri (AR) and Agrawal (YC). **Effect of process variations on dried ginger quality.** *Indian Food Packer* 45(4): 1991: 13-16

Drying characteristics and quality of (i) peeled sliced ginger (ii) unpeeled and pretreated with 2% lime solution was compared with that of (iii) peeled ginger and (iv) unpeeled ginger. Dehydration was carried out at 65 C upto 12% moisture content (wet basis). The volatile oil content retention was more in unpeeled ginger, but the pungency, aroma and acceptance to purchase decreased. Unpeeled ginger took more time (2 - 4 folds) for drying. Pretreatment of ginger did not influence the quality. Slicing of ginger improved the acceptance to purchase and also reduced the drying time by 6 folds. VKR

472

Gopalakrishnan (M) and Narayanan (CS). **Determination of ginger oil by solvent partition.** *Indian Food Packer* 45(4): 1991: 35-41

Solvent partition of ginger oil by batch extraction with hexane/ethanol (70%) solvent system afforded a reasonably good flavour enriched fraction (yield - 10%) containing 6% hydrocarbons. Batch extraction with 1:4:2.5 (oil:hexane:ethanol) ratio provided the overall best results. Counter current extraction under identical conditions gave poor yield. Extraction of oxygenated compounds directly with a polar solvent (70% ethanol) also did not give encouraging results. VKR

Pepper

473

Lee (DS), Chung (SK), Kim (HK) and Yam (KL). **Non-enzymatic browning in dried red pepper products.** *Journal of Food Quality* 14(2): 1991: 153-163

Whole pepper and pepper powders, coarse and fine with and without seeds were studied under water activities, storage temp. and packaging atm. The browning being zero order reaction, the rate constant was significantly affected by a_w and temp. and flushing the package with nitrogen showed no advantage. With a_w below 0.3, whole pods or coarse powder with seeds had min. browning. SD

Turmeric

474

Vijayalakshmi (K), Ayyanna (T) and Ratna Sudhakar (T). **Relative susceptibility of turmeric varieties to *Lasioderma serricorne* Fab. during storage under laboratory conditions.** *Bulletin of Grain Technology* 28(2): 1990: 124-127

Relative susceptibility of 5 turmeric var. (Sugandham, Cuddapah, Kasturi, Duggirala and Tekurprta) to *L. serricorne* Fab. was assessed on the basis of adult emergence, developmental period, index of susceptibility and wt. loss due to infestation under lab. conditions. The test var. were categorised into resistant, moderately resistant and susceptible based on their index of susceptibility. Var. Kasturi was moderately resistant, and other var. were susceptible. KAR

SENSORY EVALUATION

475

Sherman (P). **The complexity of rheological evaluation of the firmness/hardness of solid foods.** *Italian Journal of Food Science* 1(3): 1989: 21-30

The principal factors which influence the rheological evaluation of the firmness/hardness of solid foods are reviewed. They include the sample's shape, its length/diameter ratio, the rate of deformation, surface friction and lubrication. If the aim of the rheological test is to imitate the conditions prevailing during the consumer's sensory evaluation of this textural property then very high rates of deformation must be used. The low rates of deformation that are generally used can lead to erroneous conclusions. Surface friction increases the force required to compress a food. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

476

Kiran Kumari, Shina (MM), Mehto (DN) and Hammed (SF). **Effect of some vegetable oils as protectants against pulse beetle, *Callosobruchus chinensis* (Linn.).** *Bulletin of Grain Technology* 28(1): 1990: 58-60

Experiment was conducted under a typical godown condition with temp. 22.3 plus or minus 4.1 C and RH 70.3% at the Tirhut college of Agriculture, Dholi, Muzaffarpur during 1986 to evaluate the efficacy of mustard oil (*Brassica campestris*), linseed oil (*Linum usitatissimum*), til oil (*Sesamum indicum*), groundnut oil (*Arachis hypogaea*), neem oil (*Azadirachta indica*), and mahua oil (*Bassia latifolia*) as grain protectant at 1% level against *Callosobruchus chinensis* (Linn.). Observations were recorded for no. of eggs, no. of adults, damaged grains, by no. and by wt. at the end of one, two and three months. All the vegetable oils tested proved equally effective for reduction in the % of damaged grains by number as well as by wt. KAR

477

Hadler (MR). **Second generation anticoagulant rodenticides: Their effectiveness and economics.** *International Pest Control* 32(4): 1990: 100-102

Second generation anticoagulants can thus be seen to be most cost/effective, to be more reliable and to offer substantial savings in time and effort when compared with the first generation products. They are also more broadly applicable overcoming the resistance to warfarin which is present in virtually all mouse populations and widespread in rats in Britain today. With rat numbers rising and with

costs continually under scrutiny it is important that pest control organisations take full advantage of the greater activity of the second generation anticoagulants to increase the efficiency of their operators. This will have the effect of increasing the capacity for rodent control in their own organisations and expand the total resource available for controlling threatening rat populations. AS

BIOCHEMISTRY AND NUTRITION

478

Koseki (M), Tsuji (K), Kazama (M), Kitabatake (N) and Doi (E). **Interaction between dietary cholesterol or fatty acids and water-soluble fibers and increase in cholesterol excretion by pectin in rats.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 37(7): 1990: 559-564

Excretion of cholesterol into the feces increased with the feeding of pectin in rats. Filtration with an ultrafilter of a mixture of cholesterol or free fatty acids with various soluble dietary fibers (SDFs) resulted in low levels of cholesterol or free fatty acids in the filtrate. Glucose, organic acids, and water soluble fatty acids were found in the filtrate even when mixed with SDFs at physiological pH. From these results, it seems that the increase in cholesterol excretion into feces by pectin may be due to the entrapment by SDF matrix or destruction of the micelles of cholesterol or fatty acid with SDF. AS

479

Bello (CO) and Keshinro (OO). **Contribution of mid-day meals to the daily nutrient requirement of school children in Nigeria.** *Food Chemistry* 39(3): 1991: 273-280

480

Matsuda (T), Kato (Y) and Nakamura (R). **Lysine loss and polymerization of bovine β -lactoglobulin by amino carbonyl reaction with lactulose (4-O- β -D-galactopyranosyl-D-fructose).** *Journal of Agricultural and Food Chemistry* 39(7): 1991: 1201-1204

Loss of lysine, protein polymerization, and production of fluorescent substances were investigated for bovine β -lactoglobulin stored with lactulose (4-O- β -D-galactopyranosyl-D-fructose) at 50 C and 65% rh for 10 days as a model system for dried milk and milk products supplemented with lactulose. Reactivity of lactulose with protein amino groups was much lower than that of lactose, whereas the lactulose induced the protein

polymerization and production of fluorescent substances not less strongly than lactose did. These results suggested that the effect of the amino carbonyl reaction between lactulose and milk proteins on protein nutritive value, i.e., lysine loss, was not very serious but that proteins reacted with lactulose were easily polymerized by cross-linking through lactulose-lysine amino carbonyl adducts. AS

TOXICOLOGY

481

Thompson (DP). **Influence of pH on the fungitoxic activity of naturally occurring compounds.** *Journal of Food Protection* 53(5): 1990: 428-429

The optimum pH for growth for eight toxigenic strains of *Aspergillus* was recorded at pH 6 in unamended potato dextrose broth medium. Significantly less mycelial growth was observed at pH 4 and 8, resp., for all of the fungal strains. In the presence of 1.0 mM of thymol, mycelial growth was completely inhibited at pH 4, 6 and 8 for all the fungal strains. Carvacrol, at the same concn., completely inhibited the growth of the fungi only at pH 4 and 8. At lower concn. (0.1 and 0.5 mM), in the presence of thymol or carvacrol, partial mycelial inhibition at all pH levels was observed with significantly less mycelial growth at pH 4 and 8. AS

482

Kang (Y-J) and Frank (JF). **Evaluation of air samplers for recovery of artificially generated aerosols of pure cultures in a controlled environment.** *Journal of Food Protection* 52(8): 1989: 560-563

All Glass Impinger-30 (AGI-30), Andersen 6-stage Selve Air Sampler (Andersen impactor), Reuter centrifugal air sampler (RCS sampler), and Millipore open type membrane filter sampler (Filter sampler) were evaluated for recovery of artificially-generated aerosols of pure cultures of *Pseudomonas fluorescens*, *Escherichia coli*, *Streptococcus faecalis*, and endospores of *Bacillus subtilis*. Size distribution of the aerosol was analyzed to determine its relationship to air sampler efficiency. Five min after the spray, 71 to 85% of particles were between 1.1 - 3.3 μm in size and 3.5 to 10.4% were smaller than 1.1 μm in size. The Andersen impactor recovered significantly greater numbers of nonsporeforming bacteria, with least variability of recovery and the RCS sampler recovered significantly smaller numbers and exhibited greatest variability of the 4 samples tested. AGI-30 and Filter sampler performance varied depending on the species tested. For recovery of bacterial

endospore, the filter and Andersen samplers both recovered greater numbers than the AGI-30 and RCS sampler. The RCS sampler recovered a significantly lower number of spores with the most variable results of the four samplers. Our data indicate that the Andersen impactor is the sampler of choice for recovering microbial aerosols of interest to the food processing industry. AS

483

Yagen (B), Hutchins (JE), Cox (RH), Hagler (WM) and Hamilton (PB). **Aflatoxin B₁S: Revised structure for the sodium sulfonate formed by destruction of aflatoxin B₁ with sodium bisulphite.** *Journal of Food Protection* 52(8): 1989: 574-577

A promising method for the destruction of aflatoxin B₁ in commodities, is treatment with sodium bisulphite to yield a single major product, aflatoxin B₁S. On the basis of nuclear magnetic resonance, ultraviolet and infrared spectra, elemental analysis, mass spectroscopy, deuterium labeling and stability to highly acidic conditions, the structure of aflatoxin B₁S was established as the 15 α -sodium sulfonate of aflatoxin B₁. The formation of aflatoxin B₁ products substituted at the 15 position only is unprecedented and implies an unusual mechanism. The formation of a single *trans* addition product under conditions that seemingly rule out a previously proposed free radical mechanism suggested a newly proposed ionic reaction mechanism. The completeness of the reaction and the water solubility of aflatoxin B₁S support the promising use of bisulphite to destroy aflatoxin. AS

484

Jimenez (B), Gonzalez (MJ) and Hernandez (LM). **Presence of PCDDs and PCDFs in food for human consumption: A review.** *Food Chemistry* 39(3): 1991: 257-271

This review reports the levels of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in various foodstuffs (fish, meat, vegetables and fruit and dairy products). The data shows that most animal foodstuffs have already been contaminated by those contaminants, even though in very small amounts. The plant products are free of most PCDDs and PCDFs. It is difficult to evaluate the different sources of contamination of food, but municipal solid waste incinerators and chlorophenol industries are likely to be the most important sources. 28 references. BV

FOOD LAWS AND REGULATIONS

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485

Naik Kurdade (AG). **Processed fruits and vegetables - India can be on the world map soon.** *ISI Bulletin* 4(10): 1991: 409-410

The author gives a brief scenario of the fruit and vegetable processing industry in India and points out the constraints and suggests to improve the quality of the products through standardisation which will improve the domestic consumption and export market. SRA

486

Shashi Sareen. **Formulation of standards on convenience foods.** *ISI Bulletin* 4(10): 1991: 411-413, 424

Convenience food industry in India has grown, of late at a rapid rate indicating the need for standardisation in the industry. Indian convenience foods have been classified as snacks, ready mixes and instant foods and a brief mention is made about where standards have been formulated. The parameters to be considered with standardisation are quality of raw materials, hygienic conditions at the preparation site, limits to be prescribed for different parameters, and also standardisation on nutritional, packaging and labelling requirements. The problems faced during the formulation of standards for snack foods have been briefly described. SRA

FOOD PROCESSING

Nil

FOOD PACKAGING

487

Anon. **Packaging - the new horizon.** *Packaging India* 23(5): 1990: 19, 21

Aspects covered in this article include: flexible pouches, Brick style/Gable top cartons, bag-in-box, collapsible laminated tubes, rigid plastic container and hazards of packaging production. CSA

488

Anon. **Role of packaging in '90's. New horizon.** *Packaging India* 23(5): 1990: 27-30

489

Shrinivas Dighe. **Surface design in food packaging.** *Packaging India* 23(5): 1990: 31-33

490

Ishida (O). **Overview on Asean food processing and packaging.** *Packaging Japan* 12(61): 1991: 65-70

This article provides an overview of 6 Asean food processing and packaging countries. They include Singapore (growth of prepackaged foods, governmental support, food retail, machinery market); Thailand (packaging materials and machines); Brunei (promising agro-business, future); Indonesia (food processing and packaging, machinery market); Malaysia (growth potential, machines and materials); Philippines (food processing and packaging). CSA

491

Shibauchi (Y) and Hatanaka (K). **Sterilization of packaging containers with gasified hydrogen peroxide.** *Packaging Japan* 12(62): 1991: 65-69

The sterilizing method of molded containers by using hydrogen peroxide gas and its practical application are discussed. This article deals with the development of the hydrogen peroxide vaporizer-vaporizing characteristics of hydrogen peroxide decomposition rate of hydrogen peroxide, necessary conditions for designing a vaporizer; elimination of hydrogen peroxide from the surface of packaging materials sterilized; transmittance of UV rays within hydrogen peroxide - absorption of UV rays by hydrogen peroxide, effect of the joint use of hydrogen peroxide gas and UV rays; sterilization. Results indicate hydrogen peroxide gas possessed the effective sterilizing effect and it presented a sort of synergistic effect when it was combined with UV rays. Considering the fact that even low-concn. of hydrogen peroxide gas is effective in sterilization when UV rays are used together, the combined method may be effective and efficient in the practical application. CSA

492

Hishinuma (K). **Development of technologies on control for "powder dancing" and "liquid dripping" in the packaging process.** *Packaging Japan* 12(62): 1991: 74-79

493

Anon. **Future trend in heat resistant processing materials and containers. From exclusive-use types to double-use type.** *Packaging Japan* 12(61): 1991; 46-47

This article discusses the heat resistant packaging materials and containers and the microwavable food market - national brand market, store brand market and the new microwavable packaged foods newly introduced. CSA

FOOD ENGINEERING AND EQUIPMENT

494

Sastry (SK) and Palaniappan (S). **The temperature difference between a microorganism and a liquid medium during microwave heating.** *Journal of Food Processing Preservation* 15(3): 1991; 225-230

Results of the analysis using heat transfer principles showed that because of the microscopic size of bacteria, the surface area to volume ratios of organisms were extremely high causing heat loss to the environment. So the microorganisms required to possess extremely high dielectric loss factors to maintain even small temp. differences. The energy adsorption difference for 1 C difference between microorganism and medium for a range of conditions was shown. SD

495

Watanabe (H) and Sakai (Y). **A one-dimensional stress pulse propagation model for cryo-comminution of agglomerated granules into individual granules.** *Journal of Food Process Engineering* 14(1): 1991; 9-19

An elementary theory of stress pulse propagation was applied to a one-dimensional mathematical model for cryo-comminution of agglomerated granules into individual granules. An assembly of granules is approximated by a bar constructed with blocks stuck together. When an impulsive loading is given at one end of the bar, a compressive stress pulse generates there and propagates through the bar. When it survives after transmitting through the interfaces between blocks and reaches the opposite free end, the compressive stress pulse turns into a tensile stress. This tensile stress causes separation of the block located farthest away from the loading end, provided the intensity of the stress pulse exceeds the tensile strength of the material. The

model successfully explained the experiment on shattering orange juice ice as well as frozen citrus fruit. AS

496

Owusu-Ansah (YJ). **Advances in microwave drying of foods and food ingredients.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991; 102-107

The use of microwaves in various food dehydration applications is reviewed. The microwave drying equipment (booster dryer, vacuum dryer and freeze dryers); the economics of microwave drying and its potential applications in the food industry are discussed. 10 references. GS

Equipment

497

Haque (E). **Application of size reduction theory to roller mill design and operation.** *Cereal Foods World* 36(4): 1991; 368-375

This feature article describes the principle on which compression or nipping type machine, impact or blow type machine, shearing or cutting type machine, and attrition type machine functions. The author also discusses the various factors affecting the roller mill performance. BV

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

498

Su (C-H) and Yang (C-P). **Partial removal of various food components from aqueous solution using crosslinked polymers of cyclodextrins and epichlorohydrin.** *Journal of the Science of Food and Agriculture* 54(4): 1991; 635-643

Polymer gels prepared by polymerising cyclodextrin, its derivatives and dextrin with epichlorohydrin were studied for effect in removing natural food components-naringin, caffeine and theobromine from aqueous solution. The capacity of the gel to remove natural products was highest for naringin, intermediate for vanillin, and lowest for caffeine and theobromine. Aqueous sodium hydroxide (0.5 M) effectively regenerated a β CD-ECH gel for repeated binding of naringin. About 97% of relative removal

efficiency was retained after 7 regenerations in batch operation. A column procedure was also effective for naringin removal. BV

499

Wedzicha (BL) and Goddard (SJ). **The state of sulphur dioxide at high concentration and low water activity.** *Food Chemistry* 40(2); 1991: 119-136

The pK of sulphurous acid is reduced by salts (NaCl, NaNO₃) causing greater concn. and increasing the nucleophilic reactivity of the preservative. Nonelectrolytes have either no effect (e.g. sucrose) or tend to increase pK (e.g. ethanol, glycerol and PEG-400). Water activity found in dehydrated/partially dehydrated foods is not the variable which determines the pK values in presence of nonelectrolytes. The effects of electrolytes and nonelectrolytes on the pK of sulphurous acid are relevant to acid foods containing preservatives. With ethanol there is a tendency for the solute to encourage formation at a given pH of larger amounts of sulphurous acid than expected from existing pK values in water and increase antimicrobial activity of the preservative by increasing the concn. of the active constituent. SD

500

Pruthi (JS). **Development of simple and effective techniques for identification of irradiated foods - A resume.** *Beverage and Food World* 17(1); 1990: 17-18

This article considers essential pre-requisites of the desired test, criteria for a quantitative test, techniques studied: electron spin resonance technique, thermoluminescence technique, radiation modified DNA technique, lipid radiolysis products technique, carbohydrate and protein radiolytic products and modified limulus lysate method. SRA

Chemistry

501

Hong (YC), Koelsch (CM) and Labuza (TP). **Using the L number to predict the efficacy of moisture barrier properties of edible food coating materials.** *Journal of Food Processing Preservation* 15(1); 1991: 45-62

A computer model developed indicated that when the L number, the ratio of the moisture permeance of a food substance to that of a coating material, is smaller than 0.04, the main resistance to moisture transfer for a coated food material is the diffusion of moisture within the food material itself and is larger

than 4, the main resistance to moisture transfer is the permeance of the coating material which was adopted to predict the effectiveness of different coating materials for dried foods. SD

502

Hoyland (DV) and Taylor (AJ). **A review of the methodology of the 2-thiobarbituric acid test.** *Food Chemistry* 40(3); 1991: 271-291

Aspects covered include history and chemistry of the thiobarbituric acid (TBA) test, TBA test procedures, interference in the TBA test, modifications to the TBA test, standardisation and recovery from TBA tests, limitations of the TBA test, correlation of TBA test with chemical and sensory analysis and other TBA procedures. 121 references. SD

Chemistry(Analytical)

503

Dhingra (PK). **Food analysis - need and objectives.** *ISI Bulletin* 4(10); 1991: 408, 410

The author briefly describes the purpose of food analysis and methods available. The standard methods available both nationally and internationally, the method of sampling before analysis, and the criteria applied before selecting the appropriate test method and the probable sources of error have been explained. SRA

504

Speek (AJ), Speek-Saichua (S) and Schreurs (WHP). **Determination of macronutrient and micronutrient levels in Thai foods. An evaluation of the Thai food composition table.** *Food Chemistry* 40(3); 1991: 251-262

505

Sarrade (S), Rios (GM), Autret (JM) and Takerkart (G). **Tentative analysis of gelatin ultrafiltration by gel permeation chromatography.** *Lebensmittel-Wissenschaft und -Technologie* 24(1); 1991: 23-28 (Fr)

In this paper, various permeate and retentate samples taken at different times during the ultrafiltration of a gelatin solution on a new ruthenium-titanium oxide membrane coated onto an alumina support have been analysed using the gel permeation chromatography (GPC) technique. It is shown how the use of this fairly sophisticated method, coupled with the more traditional approach (consisting of a continuous recording of permeate flow rate and total nitrogen rejection rate) allow a better insight into the basic mechanisms that control membrane fouling and the effect of it on

performance. For the particular system investigated, it is clearly apparent that as long as the ruthenium-titane oxide membrane effectively controls the separation, cake filtration mechanisms prevail. But, when the effects of the alumina support become pre-eminent, deep filtration mechanisms substitute for them. AS

506

Endress (H-U), Omran (H) and Gierschner (K). **Monitoring the course of enzymatic degradation of pectic substances by automated fast ion chromatography (FIC).** *Lebensmittel-Wissenschaft und -Technologie* 24(1); 1991; 80-85

The enzymic degradation of pectic substances and the separation and detection of the reaction products were monitored using modern, quick and accurate methods (6). It was possible to follow the degradation process of the pectic substances, using commercial pectic enzyme preparations. The results show that oligogalacturonic acids with DP = 2 - 6 were degraded to the monomer when using Pectinex Ultra SPL without any inhibition by the end products. The existence of an exo-oligogalacturonase in the commercial pectic enzyme preparation used could therefore be confirmed. During the degradation of Na-polygalacturonate, oligomers with DP = 8 - 9 predominated in the early phase of treatment. It can therefore be said that the endo-polygalacturonase (or pectate lyase) in the commercial enzymes used preferred to attack the substrate in positions that allow oligomers with DP = 8 - 9 to be split or, that the substrate used did not contain a homogenous galacturonide chain longer than 9 units. Further degradation of the unsaturated tri-galacturonic acid released through the enzyme activities of Pectinex Ultra SPL was not observed. It is probable that pectate lyase (PAL) is present in the commercial enzyme preparation and subsequently in the fungi media. High oligomers were not detected during the enzymic treatment of highly methoxylated pectin. AS

507

Garcia (MS), Sanchez-Pedreno (C), Albero (MI) and Sanchez (C). **Kinetic determination of iodide in pharmaceutical and food samples.** *Analyst (London)* 116(6); 1991; 653-656

A kinetic method for the detn. of iodide based on its inhibitory effect on the Pd²⁺ catalysed reaction between ethylenediaminetetraacetic acid (EDTA-Co²⁺) and the hypophosphite ion is described. The reaction was followed spectrophotometrically by measuring the decrease in the absorbance at 540 nm. Under the optimum experimental conditions of $2.6 \times 10^{-3} \text{ mol dm}^{-3} \text{ Co}^{2+}$ -EDTA, $0.4 \text{ mol dm}^{-3} \text{ H}_2\text{PO}_2^-$,

pH 3.2 (adjusted with Britton-Robinson buffer), $0.57 \text{ MUG ml}^{-1} \text{ Pd}^{2+}$ and 20 plus or minus 0.2 C, iodide was determined in the range 2 - 28 ng ml⁻¹. The method was applied to the detn. of iodide in pharmaceutical products, iodinated salts, cow's milk and infants' powdered milk. AS

508

Grob (K), Lanfranchi (M), Egli (J) and Artho (A). **Determination of food contamination by mineral oil from jute sacks using coupled LC-GC.** *Journal of the Association of Official Analytical Chemists* 74(3); 1991; 506-512

Foods transported or stored in jute bags are contaminated by batching oil (mineral oil). An automated on-line LC-GC method is described for determining the hydrocarbons in foods (nuts, coffee, cocoa products and rice contamination ranged between 5 and 500 p.p.m. BV

FOOD MICROBIOLOGY AND HYGIENE

509

Al-Dagal (M) and Fung (DYC). **Aeromicrobiology - A review.** *CRC Critical Reviews In Food Science and Nutrition* 29(5); 1990; 333-340

This article reviews the presence of microorganisms in air and their sources, the relation of airborne dust and endotoxin, the sources of atm. microbial contamination in food processing plants, the mechanisms of airborne particle deposition, the importance of airborne microbes, the survival of microorganisms in air, methods of air sampling, airborne microbial populations in food-processing plants, control of airborne microorganisms in food-processing plants, and the general issue of microorganisms in air and their impact on food safety. 78 references. BV

Enzymes

510

Roch-Chui Yu and Hang (YD). **Purification and characterisation of a glucoamylase from *Rhizopus oryzae*.** *Food Chemistry* 40(3); 1991; 301-308

Glucoamylase (EC 3.2.1.3) of *Rhizopus oryzae* NRRL 395 was sevenfold purified by sequential ammonium sulphate fractionation, Bio Gel P-100 gel filtration, Q-sepharose anion exchange and S-sepharose cation exchange and the following results were observed: pH 4.8, temp. 60 C, mol. wt. 67000 daltons, pl 8.7, K_m for amylopectin 0.98, soluble starch 1.34 mg/ml, V_m for amylopectin 782,

soluble starch 136 MU moles of glucose produced/mg of protein/min. The enzyme activity was inhibited by Hg^{2+} , Pb^{2+} and Cd^{2+} , but not by EDTA. SD

Microorganisms

511
Manninen (MT), Fung (DYC) and Hart (RA). **Spiral system and laser colony scanner for enumeration of microorganisms.** *Journal of Food Safety* 11(3): 1991: 177-187

Aerobic Plate Count (APC) and spiral plate (Spiral) methods using both manual counting (MC) and laser counting (LC) procedures were compared for pure bacterial, yeast, and mold cultures and raw milk samples. All four combinations of methods (APC-MC, APC-LC, Spiral-MC, and Spiral-LC) gave similar $\log_{10}$ counts of studied pure microbial cultures, producing results that were not different for the purposes of practical microbiology. With bacterial and yeast cultures, counts differed by less than half a logarithmic cycle (the range of difference = -0.26 to +0.42), the range of difference being -0.03 to +0.62 for *Aspergillus flavus* and *Penicillium camemberti* molds. An exception was noticed with *Rhizopus oligosporus* mold plates were read by laser due to large (10 - 15 mm) colony size. The difference between the readings made manually and by laser colony scanner was about one logarithmic cycle with both APC and Spiral methods. Statistical analyses of the manually read results of bacterial and *Saccharomyces cerevisiae* spiral plates showed no differences at the 0.05 level of significance between the readings made by 4 or 5 persons. For raw milk samples, Spiral-MC and Spiral-LC methods gave higher microbial numbers than APC-MC (63% of samples) and APC-LC (54% of samples) at 0.05 level of significance ($p < 0.001$). Of the LC results, 75% were within a plus or minus 0.5 logarithmic cycle range when compared to MC results, of which 98% were within the same range. All results were still within a plus or minus 1.0 logarithmic range. When APC and Spiral for raw milk samples were analyzed, LC gave higher microbial numbers compared to MC: 71% of the APC-LC results were higher than APC-MC results, and 85% of Spiral-LC results were higher than Spiral-MC results at 0.05 level of significance ($p < 0.001$). 77% of the results by either plating technique were within a plus or minus 0.5 logarithmic range. AS

Algae

512
Horie (Y), Sugase (K) and Horie (K). **Dietary fibre in brown algae and mushrooms.** *ASEAN Food Journal* 6(1): 1991: 32-33

Bacteria

Escherichia coli

513
Singleton (ER), Hamdy (MK), McCay (SG) and Zaparka (FA). **Detection of fimbriae (CFA/I) on enterotoxigenic *Escherichia coli* using antibodies.** *Journal of Food Safety* 11(3): 1991: 215-225

Fimbriae (CFA/I) were isolated after detachment from an enterotoxigenic *Escherichia coli* (ETEC) strain H10407, purified by successive isoelectric point precipitation at pH 3.5, and injected into rabbits. The antisera containing the polyclonal antibodies against the fimbrial proteins (antigens) were then used to detect the presence of CFA/I on other *E. coli* cultures using an indirect ELISA system. The ELISA procedures for the CFA/I assay was as sensitive as the DNA hybridization for detecting the ETEC strains. Two bands (major and minor) were present when the isolated fimbrial proteins were subjected to SDS-PAGE. The major band had a mol. mass of 40.3 and the minor 36.4 kDa. Electron microscopy of the fimbriae appeared as thin thread rods with variable length (5 - 15 μm). AS

Listeria

Listeria monocytogenes

514
Yu (LSL) and Fung (DYC). **Oxyrase enzyme and motility enrichment Fung-Yu tube for rapid detection of *Listeria monocytogenes* and *Listeria* species.** *Journal of Food Safety* 11(3): 1991: 149-162

A rapid and simple method using a U-shaped glass apparatus (Fung-Yu tube) for early detn. of the presence of *Listeria monocytogenes* and *Listeria* species in mixed cultures and inoculated meat samples has been developed. This system utilizes unique biochemical and physical properties of *Listeria* for selective enrichment. Fraser broth was used as a selective enrichment broth especially for observation of esculin hydrolysis (blackening of broth), and semisolid Modified Oxford agar was used for selective detection of motility of *Listeria*. When Fung-Yu tubes containing 0.1 unit/mL of OxyraseTM (membrane fractions of *Escherichia coli*) were inoculated with *L. monocytogenes*, an enhanced early growth of *L. monocytogenes* occurred. A presumptive positive result for low numbers of *L. monocytogenes* (1 - 100 CFU/g) in the presence of

large numbers of competitive microflora in pre-enriched (24 h) ground beef samples using the Fung-Yu tube method with the aid of OxyraseTM was obtainable within 10 h. Using this system, isolation of *Listeria* in the presence of mixed bacterial flora (44 species), such as *Bacillus*, *Escherichia*, *Klebsiella*, *Proteus*, *Salmonella*, *Shigella*, *Staphylococcus*, and *Streptococcus*, and in inoculated ground beef was successful in 24 - 48 h. The Fung-Yu tube procedure is a highly sensitive, selective, and easy-to-use method to separate and isolate *L. monocytogenes* and other *Listeria* spp. from other contaminating microorganisms in meats. AS

515

Yu (LSL) and Fung (DYC). **Effect of oxyrase enzyme on *Listeria monocytogenes* and other facultative anaerobes.** *Journal of Food Safety* 11(3): 1991: 163-175

The use of an oxygen-reducing membrane fraction to stimulate growth of some anaerobic bacteria has been reported. In this study, stimulated recovery of *Escherichia coli* 0157:H7, *Salmonella typhimurium*, *Streptococcus faecalis*, and heat injured *Listeria monocytogenes* was achieved by using broth media supplemented with OxyraseTM (membrane-bound enzyme system derived from *E. coli*). The OxyraseTM enzyme allowed rapid growth of these facultatively anaerobic organisms in a nonselective broth. The activity of OxyraseTM in four different selective enrichment broths to support growth of *L. monocytogenes* also was evaluated. Among tested broths, FDA-approved *Listeria* Enrichment Broth containing OxyraseTM was found to be substantially superior for facilitating the growth of *L. monocytogenes*. OxyraseTM promoted a significantly greater number of *L. monocytogenes* than commonly used but nonspecific reducing agents, such as L-cysteine HCl and sodium thioglycolate. These findings indicated that all organisms tested can be grown well in liquid media using the oxygen consuming membrane fragments to achieve and maintain oxygen-limited conditions. The OxyraseTM enzyme system has potential applications in some selective media and other diagnostic tests specified for rapid detection of these facultatively anaerobic pathogens. AS

516

Fuchs (RS). ***Listeria monocytogenes*.** *ASEAN Food Journal* 6(1): 1991: 3-13

This review describes the findings and covers the taxonomy and characteristics of *Listeria*, and methods for their isolation from foods. Aspects like outbreaks of listeriosis and occurrence of *L. monocytogenes* in foods, effects of heat, chilling and

freezing, effects of pH, additives, irradiation sanitising agents are briefly covered. 100 references. SRA

Salmonella

517

Martin (A) and Katz (SE). **A resuscitation/selection system for rapid determination of *Salmonella* in foods.** *Journal of the Association of Official Analytical Chemists* 74(3): 1991: 522-525

A resuscitation medium was developed consisting of a trypticase soy broth base supplemented with 0.5% yeast extract, 0.25% sodium pyruvate, 0.01% sodium thioglycollate, and 0.1% chicken fat. After a resuscitation period of 4 h, the medium was made selective by addition of either sodium thiosulphate, bile salts and iodine, or sodium selenite and L-cystine. The new selective medium was incubated for 16 h. The presence or absence of *Salmonella* was determined by the *Salmonella*-Tek antibody-based detection kit. The present system was compared with a method of the Bacteriological Analytical Manual (BAM) for naturally contaminated foods. Nineteen egg products were screened: 3/19 were positive using the BAM method, 9/19 were positive using the present system. Seventeen chicken samples were assayed: 10/17 were positive using the BAM method; 13/17 were positive using the present system. Of 8 pepper samples, 4/8 were positive using the BAM method; 6/8 were positive using the BAM method, 7/8 were positive using the present system. Of 6 onion products sampled, 5/6 were positive using the BAM method; 6/6 were positive using the present system. AS

Fungi

518

Pasculli (R), Geraeds (C), Voragen (F) and Pilnik (W). **Characterization of polygalacturonases from yeast and fungi.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 63-70

Three endopolygalacturonases (endo-PG) were purified from lab. *Kluyveromyces fragilis* culture (PG I) and from commercial pectinase preparation based on *A. aculeatus* (PG II) and *A. niger* (PG III). Their action on six different substrates was studied, which were prepared from apple and sugar-beet pectins and modified for specific degrees of methyl- and acetyl-esterification. Degradation of these substrates by the three endo-PGs was measured by HPLC and reducing end-groups analysis. PG action was seen to be limited strongly by methyl ester and acetyl groups and significantly by the neutral sugar side chains of the beet pectin. On de-esterified apple pectin PG I showed the degradation pattern of

multichain attack whereas PG II and PG III acted according to a single chain multiple attack mechanism. PG II was the only enzyme that produced a lot of monomer. PG I could not split dimers and PG I and PG III did not seem able to hydrolyze trimers, which accumulated in the hydrolysis products. Results obtained with demethylated sugar-beet pectin showed that acetyl groups influenced the degree of breakdown rather than the rate of breakdown. AS

Mushrooms

519

Joshi (VK), Seth (PK), Sharma (RC) and Sharma (R). **Standardization of a method for the preparation of sweet chutney from edible mushrooms *Agaricus bisporus* (L.).** *Indian Food Packer* 45(2): 1991: 39-43

Two types of button mushroom (*Agaricus bisporus*) chutney by 7 (A, B, C, D, E, F and G) different recipes were prepared and microbial and chemical analysis were carried out. The product without pre-cooking in the cooker had considerable number of microorganisms while these were not found in pre-cooked mushrooms. The total soluble solids of the product ranged from 55 to 71.5° B and acidity 0.95 to 2.14%. No significant difference was observed between the colour of the products in all recipes. The product with shreds from the recipe G had better sensory qualities and good shelf-life. VKR

Yeasts

520

Agab (MA) and Collins (M). **Effect of treatments environment (temperature, pH, water activity (a_w)) on the heat resistance of yeasts.** *Journal of Food Science and Technology (India)* 29(1): 1992: 5-9

Yeast cultures of *Debaromyces hansenii* Y-7268 *Kluyveromyces bulgaricus* SG 120, *K. fragilis* NCYC 587, *Saccharomyces cerevisiae* SG 271, *S. cerevisiae* NCYC 716, *S. chevallieri* SG 65 and *S. uvarum* PS 22 were used in this study. The highest survival levels in buffer occurred at pH 6 or occasionally at pH 5.4 and the lowest at pH 7, whilst in a_w reduced menstruum highest survivor levels at pH 6 and 7 and the lowest at pH 5.4. Plasmolysis of yeast cells conferred a higher degree of resistance to heat treatment especially where 60% sucrose was used as a plasmolysing agent enabling 2/3 yeasts used to survive 5 C higher temp. than normal. AS

521

Agab (MA) and Collins (M). **Effect of heat treatment on aerobically and anaerobically grown or starved yeast cell in different pH menstrua.** *Journal of Food Science and Technology (India)* 29(1): 1992: 10-13

Yeast used in this study were *Hansenula subpelliculosa* Y-1096, *Kluyveromyces bulgaricus* SG 120, *Kluyveromyces lactis* Y-8279, *Saccharomyces cerevisiae* NCYC 716 and *Saccharomyces uvarum* PS 22. Yeasts grown anaerobically before heat treatment displayed higher levels of survival only at the lowest treatment temp. (50 C) used. This might be explained by either changes in membrane lipid comp. or the reduction in levels of cytochrome oxidase in cells grown under anaerobic conditions. Cell starvation prior to heat treatment only enabled yeasts to withstand the same heat treatments as normally grown cells although in 2/3 of the yeasts tested a significant ($P > 0.05$) higher proportion of heat treated starved cells survived any one heat treatment. AS

522

Hart (RA), Mo (O), Borius (F) and Fung (DYC). **Comparative analysis of trypan blue agar and Congo red agar for the enumeration of yeast and mold using the HGMF system.** *Journal of Food Safety* 11(3): 1991: 227-230

Enumeration of yeast and molds from 39 food samples, including 6 dairy products, 2 meat products, 5 cereal products, 9 fruits, 4 vegetables, 6 beverages, 4 spices, and 3 condiments on Trypan blue (at 1:10,000 dilution) in potato dextrose agar (Trypan blue agar) was compared with Congo red (at 25:1,000,000 dilution) in potato dextrose agar (Congo red agar) using the hydrophobic grid membrane filter (HGMF) technique of the ISO-GRID system. Yeast and mold grew well on both Trypan blue agar and Congo red agar, producing blue and red colonies, resp., in the ISO-GRID system, when examined in incandescent light. However, not all yeast and mold colonies grown on Congo red agar fluoresced under ultraviolet (UV) light (a recommended observation procedure). Thus, results indicated that Trypan blue agar observed in incandescent light is more convenient to use for enumerating yeast and mold in food samples. AS

BIOTECHNOLOGY

Nil

Nil

FOOD ADDITIVES

523

Yoshida (A), Takagaki (Y) and Nishimune (T). **Enzyme immunoassay for hen egg white lysozyme used as a food additive.** *Journal of the Association of Official Analytical Chemists* 74(3): 1991: 502-505

524

Matsunaga (T). **New labeling requirements of food additives in Japan.** *Packaging Japan* 12(62): 1991: 22-26

This article deals extensively on the historical background of the Japanese food sanitation law and the new labeling requirements of food additives - scope of labeling requirements; name of the additives; labeling by category name and individual name; labeling by collective name; exemption from labeling requirements; food labeling requirements. Examples (carbonated diluted juice, sausage instant Chinese noodle, bread and soy sauce) of changes in labeling of food additives are given. CSA

Colourants

Annatto

525

Aparnathi (KD) and Sharma (RS). **Annatto colour for food: A review.** *Indian Food Packer* 45(2): 1991: 13-27

Annatto, a vegetable colouring matter is derived from the pericarp of the seeds of *Bixa crellana* L. In this review, aspects covered include: chemistry, manufacturing methods, factors contributing to storage stability, analytical aspects like extraction, resolution techniques, detection, standards and legislation and use in food, non-food, and pharmaceutical preparations. VKR

CEREALS

526

Becker (R), Wagoner (P), Hanners (GD) and Saunders (RM). **Compositional, nutritional and**

'Oahe' Intermediate Wheatgrass (IWG) having higher levels of protein (nutritionally limiting in lysine like wheat but higher levels of other amino acids) (20.8%) fat (3.21%) and ash (2.64%) than wheat was found without gluten and significant amounts of antinutrients. Stone milling of IWG kernels gave flour with farinograph characteristics more similar to whole wheat flour than flours made from impact and rolling milling. A sensory panel showed preference to appearance, texture and flavour of bread, muffins, cookies and cake containing different levels of IWG flour. SD

527

Persson (H), Nyman (M), Liljeberg (H), Onning (G) and Frolich (W). **Binding of mineral elements by dietary fibre components in cereals. In vitro (III).** *Food Chemistry* 40(2): 1991: 169-183

Soluble fibre fractions from barley flour, whole grain rye flour and oat bran showed considerable association with Cu (II), Cd (II) and Zn (II) ions the ability of which to form complexes was in the order Cu (II) > Zn (II) approx. equal to Cd (II) and the order of interaction barley > oats approx. equal to oats approx. equal to rye, important complex agent being phytic acid with pH 3.5 - 5.0, especially for oats. β -glucans from barley showed no metal complexing ability. SD

528

Letellier (MN) and Cuq (JL). **In vitro evaluation of available lysine in cereal products by near infrared reflectance spectroscopy.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 17-22

529

Wood (PJ), Weisz (J) and Blackwell (BA). **Molecular characterization of cereal β -D-glucans. Structural analysis of oat β -D-glucan and rapid structural evaluation of β -D-glucans from different sources by high-performance liquid chromatography of oligosaccharides released by lichenase.** *Cereal Chemistry* 68(1): 1991: 31-39

Oligosaccharides obtained by the action of (1-3), (1-4)- β -D-glucan-4-glucanohydrolase (lichenase) on the (1-3), (1-4)- β -D-glucan of oats (oat β -glucan) were characterized by methylation analysis. The polysaccharide was confirmed as composed mainly of β -(1-3)-linked cellotriosyl and cellotetraosyl units with a small amount of regions containing 4-8 consecutive (1-4)-linked units. ^{13}C -Nuclear magnetic resonance data confirmed these structural

features. The oligosaccharides released by lichenase were analyzed by elution with water from a Bio-Rad HPX-42A HPLC column with peak detection by an automated orcinol-sulphuric acid reaction, and the ratio of tri- to tetrasaccharide was determined. This ratio defines the major structural repeating units of the cereal (1-3),(1-4)- β -D-glucans and may be determined without prior purification of polysaccharide. The molar ratio of tri- to tetrasaccharide determined for oats was 2.1 plus or minus 0.1, for barley 3.2 plus or minus 0.3, and for wheat 3.5 plus or minus 0.4. No difference was detected between the β -D-glucan from oat brans and the whole groat. In addition, the areas or heights of the major tri- and tetrasaccharide reaction products were used for quantitation by calibration with a β -D-glucan standard. AS

530

Lamkin (WM), Unruh (NC) and Pomeranz (Y). **Use of fluorometry for the determination of uric acid in grain. Elimination of interfering fluorescence.** *Cereal Chemistry* 68(1): 1991: 81-86

The possible use of fluorometry for determining the amount of uric acid in grain, to measure insect contamination or monitor infestation was investigated. In 0.20M sodium phosphate buffer, pH 12.3, the excitation max. for the fluorescence of uric acid was 342 nm, and the emission peak was at 408 nm. In alkaline solution, the fluorescence at 408 nm was independent of pH over the range of 11 - 12.5. Fluorescence at 408 nm was linear function of uric acid concn. to several hundred p.p.m. with a lower limit of detection in the range of tenths of a p.p.m., a sensitivity sufficient for the analysis of uric acid in commercial grain samples. Direct fluorometric analysis of uric acid was not successful as a result of the presence in grain extracts of an interfering fluorescence with an excitation max. at 290 nm and an emission peak at 354 nm. The interfering fluorescence was shown to be due to the extraction, at the pH of approx. 9 used to extract the uric acid, of tryptophan-containing proteins and peptides. Most of the interfering fluorescence was from proteins with mol. wts. above 5,000, but a significant portion was due to compounds with mol wts. below 500. Quantitative removal of the interfering fluorescence was achieved by a cation-exchange procedure using Supelclean LC-SCX solid-phase extraction tubes, which contained 3-propylsulfonyl groups chemically bonded to 40- μ m silica particles with 60-A pores. AS

531

Reid (JF) and Litchfield (JB). **Recent developments in process sensors and principles of selection.** *Cereal Foods World* 36(4): 1991: 356-358, 360-362

This article highlights sensor technology important to the cereal processing industry that currently are being developed. The sensing technologies highlighted are machine vision sensing, nuclear magnetic resonance spectroscopy and imaging and biosensors. BV

532

Isdale (CE). **Opportunities for process control in the cereal industries.** *Cereal Foods World* 36(4): 1991: 364, 366-367

Briefly discusses about advanced, robust process control techniques by use of proven examples. Control techniques, rotary steam tube dryer control, multiple effect evaporator and heat exchanger are covered in this article. BV

533

Koseoglu (SS), Rhee (KC) and Lusas (EW). **Membrane separation and application in cereal processing.** *Cereal Foods World* 36(4): 1991: 376-383

This feature article describes the various aspects of membrane separation such as operation principle, membrane design and membrane application. The application of membrane process in food processing particularly with respect to separation of wheat gluten and starch, high fructose corn syrup and corn wet milling are discussed. BV

Barley

534

Ilori (MO), Akingbala (JO), Oguntimein (GB) and Ogundiwin (JO). **Adaptation of a conventional mashing profile for barley malt to sorghum malt.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 29-33

The temp. programmed mashing profile for barley malt employed by most breweries in Nigeria was adapted for the mashing of sorghum malt. The effect of the addition of maize grits as an adjunct during the mashing process was also examined. The unhopped wort obtained was lower in extract, fermentable sugars and nitrogen than the commercial wort. However, the use of 10 to 25% maize grits as adjunct improved the properties of the sorghum malt wort. 20 to 25% adjunct appeared to be the optimum. The beer produced from the fermented wort gave apparent extract, real extract, alcohol by wt., colour, pH, titratable acidity, fermentable sugars and caloric levels similar to those of a commercial beer. AS

Oat

Oat bran

535

Wood (PJ), Welsz (J) and Fedec (P). **Potential for β -glucan enrichment in brans derived from oat (*Avena sativa* L.) cultivars of different (1-3),(1-4)- β -D-glucan concentrations.** *Cereal Chemistry* 68(1): 1991: 48-51

Eleven cvs of oats were fractionated into coarse and fines fractions by a simple milling procedure. There were significant differences between cvs in the (1-3),(1-4) β -D-glucan (β -glucan) concn. of the whole groat (3.91 - 6.82%) and in the bran (5.81 - 8.89%). The av. bran yield of 53.3% produced an av. β -glucan concn. in the bran than was one and a half times the concn. of the groat. Although there was a weakly significant correlation between groat β -glucan and bran β -glucan ($r^2 = 0.823$), there was sufficient variation in the ratio of bran to groat β -glucan (1.28 - 1.60) to observe significant changes in the ranking of cvs for bran β -glucan after milling. The av. starch concn. of the groat (59.1%) dropped to 49.3% in the bran and was raised to 69.7% in the fines fraction. Starch was less variable than β -glucan with a between-cv coeff. of variation of 4.9% in the groat and 6.9% in the bran compared with 15.9 and 13.8% resp., for β -glucan. AS

Rice

536

Dhaliwal (YS), Sekhon (KS) and Nagi (HPS). **Enzymatic activities and rheological properties of stored rice.** *Cereal Chemistry* 68(1): 1991: 18-21

Amylolytic, proteolytic, lipolytic and lipoxygenase changes in milled rice obtained from short-, medium-, and long-grain var. of paddy, one lot stored immediately after harvest at natural moisture and one dried to 12% moisture, were investigated after 1, 6 and 12 months of storage. Paddy samples stored after drying had significantly reduced diastatic, proteolytic and lipase activities, whereas lipoxygenase activity was not altered with drying. Stored samples had increased activities of proteases and lipases, but amylase activity was greater in freshly harvested samples. Dried samples had reduced contents of free amino acids and free fatty acids. With or without drying, free amino acid and free fatty acid content increased during storage. Peak viscosity of milled rice did not change when paddy was dried before storage but it did increase during storage. AS

Ryes

537

Delcour (JA), Vanhamel (S) and Hoskeney (RC). **Physicochemical and functional properties of rye nonstarch polysaccharides. II. Impact of a fraction containing water-soluble pentosans and protein on gluten-starch loaf volumes.** *Cereal Chemistry* 68(1): 1991: 72-76

Rye water-soluble protein-pentosan fractions improve the volume of gluten-starch loaves. A volume-dosage curve shows that the optimum concn. for such substances is 2 - 3%. The protein component of the rye material appears to have no effect on the capacity of the complex to enhance loaf volume because deproteinization does not result in a loss of the complex's activity. Ferulic acid residues of the water-soluble pentosans of rye or wheat were not involved in the interactions leading to larger loaf volumes because removal of these moieties or the addition of an excess of ferulic acid in the baking formula did not impair the role of the rye protein-pentosan material in gluten-starch systems. The action of the nonstarch polysaccharides probably is related to an increase in dough viscosity because similar baking results were found when oat β -glucan, corn bran hemicellulose, or xanthan gums were used. AS

Triticales

538

Saxena (AK), Bakhshi (AK), Sehgal (KL) and Sandha (GS). **Effect of grain texture on various milling and end use parameters of newly bred advanced triticales (wheat x rye) lines.** *Journal of Food Science and Technology (India)* 29(1): 1992: 14-16

With the increase in grain hardness, there was a significant decrease in ash content of flour. Soft textured triticales contained a significantly higher amount of protein in the flour. With increase in hardness, a significant decrease was observed in loaf as well as specific vol. The cookies prepared from soft and medium hard textured triticales recorded significantly higher cookie spread as compared to cookies from hard textured triticales. The soft and medium hard textured triticales recorded significantly higher break fraction B₁ and break fraction B₂ as also flour yields. The reduction fraction C₃, finished flour and shorts were significantly higher in hard triticales which recorded significantly lower bran recoveries. AS

539

Narpinder Singh, Sekhon (KS) and Rajvir Singh. **Studies on the improvement of quality of karnal bunt infected wheat. III. Minerals composition, chapathi and cookie making properties.** *Journal of Food Science and Technology (India)* 29(1): 1992: 1-4

The effect of debranning and lye peeling on the minerals comp. and chapathi and cookie making properties of good and bunt infected wheat was studied. Most of the minerals, significantly increased with the increase in bunt infection. Debranning and lye peeling significantly lowered the minerals in whole wheat meal and flours. The spread of cookies decreased with the increase in bunt infection. Debranning and lye peeling significantly improved the spread factor of 10% infected wheat. Overall acceptability of cookies and chapathies progressively decreased with the increase in the level of infection. Debranning and lye peeling produced good quality cookies and chapathies from a wheat having 5% infect ion as those from good wheat. AS

540

Chauhan (GS) and Santhosh Kumari. **Evaluation of wheat-defatted soy flour blends for chapathi-making quality.** *Beverage and Food World* 17(1): 1990: 40-42

The chapathi prepared from dough of wheat-defatted soy flour (10% blends was evaluated for sensory properties and showed complete inactivation of trypsin inhibitor activity (12.5%) and phytic phosphorus was slightly degraded. An 4 - 5 folds increase in reducing and non-reducing sugars. The protein content increased from 12.6 - 20.0% and moisture retention from 29.6 - 37.7% indicating longer freshness of chapathies. SRA

541

Kobrehel (K), Bois (J) and Falmet (Y). **A comparative analysis of the sulphur-rich proteins of durum and bread wheats - their possible functional properties.** *Cereal Chemistry* 68(1): 1991: 1-6

Comparison of the solubility and the electrophoretic characteristics of sulphur-rich (chloroform/methanol-soluble) proteins of durum and bread wheats showed considerable differences. Most of these proteins were readily extracted from bread wheat with the albumin-globulin fraction, whereas only some of them were extracted from durum wheat under similar conditions. The remaining sulphur-rich protein fraction of durum wheat could be separated from the other glutenin

components with Na-tetradecanoate. In bread wheat, some of the sulphur-rich proteins became bound to other gluten components during dough formation, probably through hydrophobic interactions. They were extracted from gluten partly with the gliadin and partly with the glutenin fraction. Results suggested that these proteins, as part of the gluten network, may have a functional role in the formation of dough. AS

542

Gaines (CS). **Associations among quality attributes of red and white soft wheat cultivars across locations and crop years.** *Cereal Chemistry* 68(1): 1991: 56-59

The means and distribution of correlation coeff. among seven principal wheat and flour quality attributes (test wt., break flour yield, straight-grade flour yield, flour protein content, sugar-snap cookie diameter, white layer cake vol., and alkaline water retention capacity) of 53 soft wheat cvs grown in the eastern United States were compared relative to pericarp colour (red or white). Quality attributes of red wheat cvs usually were adversely affected by protein content. Quality attributes of white wheat cvs were relatively unaffected by protein content. Among most red wheats, but not among most white wheats, high protein content was correlated with harder kernel texture. Break flour yield was correlated with alkaline water retention capacity for most white wheats, but not for red wheats. Within each colour class, individual cvs varied greatly in correlations among quality tests. AS

543

Giner (SA), Lupano (CE) and Anon (MC). **A model for estimating loss of wheat seed viability during hot-air drying.** *Cereal Chemistry* 68(1): 1991: 77-80

A first-order kinetic model for estimating the loss of viability of wheat seeds during hot-air drying is presented. Model parameters were obtained by fitting the integral form of the model to grain germination percentage, moisture, temp. and drying time. These data were determined throughout experimental drying in fluidized layers 0.08 m deep. Grain temp. varied continuously as in full-scale dryers. The Arrhenius activation energy E_a of the process was found to be 81.1×10^3 cal/mol, and the Arrhenius preactivation factor was determined to be a function of kernel moisture content. The model was compared with other experimental data, and the observed and predicted germination agreed within plus or minus 4.2% points. The model will be useful in conjunction with drying simulation models to help in the design and operation of wheat dryers. AS

Feng (G-H), Chen (M), Kramer (KJ) and Reeck (GR). **Reversed-phase high-performance liquid chromatographic separation of wheat proteinaceous inhibitors of insect and mammalian α -amylases.** *Cereal Chemistry* 68(1): 1991: 95-99

A heat-treated 0.15M NaCl extract of wheat flour was separated into four proteinaceous fractions by ammonium sulphate precipitation. Each fraction had a distinct comp. of polypeptides with apparent molecular mass of approx. 14 kDa and a distinct inhibitory spectrum of activity against human, porcine and insect (confused flour beetle and rice weevil) α -amylases. More than 10 peaks in each fraction were resolved by reversed-phase high-performance liquid chromatography (RP-HPLC) with mixtures of acetonitrile and H₂O as the mobile phase. RP-HPLC separations revealed more heterogeneity in wheat α -amylase inhibitors than was apparent from either nondenaturing or denaturing sodium dodecyl sulphate gel electrophoresis. RP-HPLC fractions were characterized further by polyacrylamide gel electrophoresis and by assaying inhibitory activity against the four different α -amylases. At least five different HPLC fractions were found to be selective inhibitors of insect α -amylases, some of which belong to the 0.28 family of inhibitors. Combining certain RP-HPLC fractions resulted in dramatic increases in inhibitory activity. These results suggest that RP-HPLC resolves the oligomeric inhibitors into their monomeric forms and that both the activity and selectivity of the inhibitors can be influenced by recombination of individual polypeptides. AS

545

Williams (PC). **Prediction of wheat kernel texture in whole grains by near-infrared transmittance.** *Cereal Chemistry* 68(1): 1991: 112-114

Wheat proteins

546

Krishnan (HB), White (JA) and Pueppke (SG). **Immunocytochemistry of wheat storage proteins: Effect of particle size of protein A - gold on labeling intensity.** *Cereal Chemistry* 68(1): 1991: 108-111

Prolamins in wheat endosperm were localized by immunocytochemistry with colloidal gold particles of different sizes as markers. These proteins were localized in the protein bodies and in vesicles associated with the Golgi apparatus. The intensity of labeling was significantly different, depending on the size of the gold particles. Intense labeling of

protein bodies and Golgi-complex vesicles was obtained with 5- and 10-nm gold markers. Labeling was much less efficient with 20-nm particles. The size of protein A-gold markers determines in large part, their binding efficiency. Consequently, careful attention should be given to size when choosing gold markers for immunocytochemical studies, especially when quantification is a consideration. AS

MILLETS

Bajra

547

Patel (KV) and Parameswaran (M). **Effects of heat treatment on lipid degradation in bajra flour during storage.** *Journal of Food Science and Technology (India)* 29(1): 1992: 51-52

Moisture content and peroxide value increased while lipase activity and free fatty acids fluctuated in bajra flour during storage. Gas liquid chromatographic profile of free fatty acids showed a fall in the proportions of oleic, linoleic and palmitic acids with storage. Heating the flour prior to storage at 50 or 100 C for 2 h lowered the rate of lipid degradation. AS

Corn

548

Adeyemi (IA), Akanbi (CT) and Fasoro (OG). **Effect of soy fractions on some functional and rheological properties of maize-banana mixtures.** *Journal of Food Processing Preservation* 15(1): 1991: 31-43

Moisture, protein, fat and ash of drum dried maize-banana mix (soy bean flour, soy milk/soy residue, maize grits and banana) were 5.60 - 9.18%, 17.89 - 22.80%, 0.46 - 7.13% and 0.75 - 2.46% resp. Bulk density for the product was 0.30 - 0.41 g/mL while that of the control containing skim milk instead of soy was 0.46 g/mL. The product was pseudo-plastic according to rheological data with power law parameters depending on the formulation. Soy-maize-banana product with soy milk showed better sensory quality. SD

549

Tabil (LG), Noomhorm (A) and Verma (LR). **Breakage susceptibility of shelled corn due to rehydration and redrying.** *Journal of Food Process Engineering* 14(1): 1991: 69-82

Processing activities such as drying expose grains to temp. and moisture gradients resulting to increased susceptibility of corn breakage. The effect of rehydration and redrying rates on the breakage susceptibility of corn was compared and evaluated. Dried corn samples were rehydrated and redried artificially. Breakage susceptibility of the samples were tested using a food grinder (blender) and Instron testing machine. Treatments consisting of a cycle of rehydration and redrying represented different rates of moisture sorption. Initial sample moisture, rehydration methods and redrying temp. were used in comparing breakage susceptibility. Samples of low initial moisture had higher breakage susceptibility as compared to higher initial moisture samples. The rehydration method representing the highest moisture adsorption rate resulted to samples which were more susceptible to breakage than the two rehydration methods representing intermediate and slow rates of moisture adsorption. Temp. of redrying also showed significant effect with high temp. (80 C) resulting to grains with higher breakage susceptibility compared to samples redried with unheated air (30 C). Breakage susceptibility increased when samples were rehydrated and increased much more when they were redried. AS

550

Steinke (JD) and Johnson (LA). **Steeping maize in the presence of multiple enzymes. I. Static batchwise steeping.** *Cereal Chemistry* 68(1): 1991: 7-12

The feasibility of incorporating multiple enzymes in steeping solutions to reduce steeping time and enhance starch separation during wet milling of maize was investigated. Maize kernels were steeped batchwise in a 0.20% sulphur dioxide solution for 48 h and 24 h, in a sulphur dioxide solution containing an additional 1.25% of a commercial multiple-enzyme preparation (Novo SP249) for 24 h, and in a sulphur dioxide solution containing an additional 1.25% of an experimental multiple-enzyme preparation (cellulase, hemicellulase, β -glucanase, pectinase and bromelin) for 24 h. Maize steeped for 48 h in 0.20% sulphur dioxide exhibited normal wet milling characteristics, but maize steeped in the same solution for only 24 h showed poor starch-fiber and starch-gluten separations during wet milling. Maize steeped in sulphur dioxide plus either treatment of multiple enzymes produced fraction yields and purities comparable to those of maize steeped for 48 h in 0.20% sulphur dioxide alone, suggesting that steeping maize in the presence of multiple enzymes and sulphur dioxide enhances separation of wet-milling fractions and may facilitate a reduction in steeping time. AS

551

Steinke (JD), Johnson (LA) and Wang (C). **Steeping maize in the presence of multiple enzymes. II. Continuous counter current steeping.** *Cereal Chemistry* 68(1): 1991: 12-17

A lab. procedure for steeping maize, which closely simulates commercial practice in wet milling, was developed and used to determine the effects of multiple-enzyme treatment on wet-milling performance. Yellow dent maize was continuously and countercurrently steeped for 24 h in a solution containing 1.25% of a multiple-enzyme preparation and 0.20% sulphur dioxide and then wet milled. Yields and protein contents of wet-milling fractions were compared with those of maize steeped for 48 and 24 h in 0.20% sulphur dioxide alone. Reducing the steeping time without adding enzymes reduced starch yield and increased the protein content of the starch. Maize steeped with multiple enzymes and sulphur dioxide for 24 h gave nearly the same yields and purities of fractions as maize steeped for 48 h in sulphur dioxide alone. Thermal properties, pasting properties, and colours of the starch were unaffected by steeping in multiple enzymes and sulphur dioxide. AS

552

Mestres (C), Louis-Alexandre (A), Matencio (F) and Lahlou (A). **Dry-milling properties of maize.** *Cereal Chemistry* 68(1): 1991: 51-56

Chemical composition and physical properties of 18 African maize samples were determined and correlated with their dry-milling performance. Semolina yield could be predicted (at almost 60%) from ash content (main factor, correlation coeff. -0.64) and sphericity or dent kernel percentage (cofactors). Vitreousness was not significantly correlated (at the 0.05 level) with semolina yield. Vitreousness, which was very time-consuming to measure, could be evaluated at almost 90% from density and dent kernel percentage or ash content. Lipid content of recovered semolinas was also positively correlated with kernel ash content. Thus, maize var. with low ash content gave high yields of semolina with low lipid content. AS

Pearl millets

553

Neelam Khetarpaul and Chauhan (BM). **Sequential fermentation of pearl millet by yeasts and lactobacilli. Changes in available carbohydrates content.** *Food Chemistry* 40(2): 1991: 235-240

Sequential culture fermentation (SCF) with yeasts (*Saccharomyces cerevisiae* or *Sacch. diastaticus* followed by lactobacilli (*Lactobacillus brevis* or *L.*

fermentum) at 30 C for 72 h significantly reduced the starch content of pearl millet (*Pennisetum typholideum*) flour (lowest when carried out by *Sacch. diastalticus* followed by *Sacch. brevis*); total soluble reducing and non-reducing sugars were also reduced significantly by SCF which may be due to utilisation of sugars by the fermenting microflora. SD

Sorghums

554

Almeida-Dominguez (HD), Serna-Saldivar (SO) and Rooney (LW). **Properties of new and commercial sorghum hybrids for use in alkaline-cooked foods.** *Cereal Chemistry* 68(1); 1991; 25-30

Twelve sorghum with different grain characteristics were cooked in lime, steeped for 5 h, washed and stone-ground into masa. Masa was sheeted, formed and baked into tortillas. Nixtamal with 49 - 54% moisture content was acceptable for stone grinding, when water was added during grinding to produce masas with 56 - 59% moisture. Masas had adequate machinability and produced acceptable table tortillas. Tortillas weighed 25 - 29 g with 45 - 49% moisture. All fresh, nonwaxy tortillas had acceptable texture. However, waxy sorghum produced sticky masa and tortillas. The av. conversion ratio of grain to tortillas was 1.5 kg of fresh tortillas/kg of raw grain. Dorado, Sureno, and Tortillero from Central America and hybrids ATX631 x TX435 and ATX631 x TX8505 from Texas Agricultural Experiment Station, College station, gave tortillas with the best colour and texture. Sorghums with tan plant colour like Dorado and Sureno produced white tortillas, whereas ATX631 x TX435 and ATX631 x TX8505 produced yellow tortillas. Soft sorghums (Dorado and Maicillos Criollos) had the shortest optimum cooking times. White sorghums differed in cooking characteristics, but most produced tortillas with acceptable colour and texture. AS

PULSES

Cowpeas

555

Shinde (GB), Adsule (RN) and Kale (AA). **Effect of dehulling and cooking treatments on phytate phosphorus, polyphenols and trypsin inhibitor activity of cowpea (*Vigna unguiculata* L. Walp.) seeds.** *Indian Food Packer* 45(2); 1991; 63-65

In cowpea (*Vigna unguiculata* L. Walp) cv. 'NI-434', 'Pusa Nylon' and 'T-3' seeds were selected for the

study. Among the var. the total 'T-3' contained higher total P (469 mg/100 g) and phytate P (221 mg/100 g) followed by 'Pusa Nylon' and 'NI-434'. The content of total and phytate P was low in hulls than in cotyledons. Dehulling increased phytate P in cotyledons. Dehulling and cooking reduced the polyphenol content by 70% and 40% resp. Dehulling alone increased the trypsin inhibitor activity, but cooking of whole seeds and cotyledons reduced the trypsin inhibitor activity by 87 - 90%. The polyphenol content was max. in the red coloured cv. 'T-3' and min. in white coloured cv. 'NI-434', therefore it is suggested that white seeded cv. may be given preference in the breeding programme. VKR

556

Ramesh (GS) and Nirankarnath. **Effect of catalase and peroxidase enzymes on acceptability of frozen green cowpea pods.** *Beverage and Food World* 17(1); 1990; 29-31

This study indicates a significant difference in overall acceptability of catalase-free or catalase-added samples and peroxidase-free or peroxidase added samples. The main difference was in their aroma and texture but no significant difference was noted in their colour or taste. Further it has shown that good quality frozen cowpea pods can be obtained by blanching them for 16 min in hot water at 95 C or 7 min in boiling water (99 C) and presence of residual peroxidase activity would not affect their acceptability. Hence, catalase should be used as an index of blanching green cowpea pods for freezing. SRA

Dry beans

557

Mafuleka (MM), Ott (DB), Hosfield (GL) and Usebersax (MA). **Dry bean (*Phaseolus vulgaris*) hardening and the consequences of pectin methylesterase activity in storage.** *Journal of Food Processing Preservation* 15(1); 1991; 1-18

Pectin methylesterase (PME) activities and hardness of decorticated Malwi bean var. evaluated at 4, 8 months storage at 0.55 a_w , 0.85 a_w and 16, 35 C showed significantly higher values than control (2 C, 0.30 a_w) and also between 8 and 4 months irrespective of a_w . Hardness, which increased due to storage, temp. and a_w , showed significant varietal difference, being not clearly influenced by PME. SD

Peas

558

Abdel-Kader (ZM). **A study of the apparent diffusion coefficients for ascorbic acid losses from peas during blanching in water.** *Food Chemistry* 40(2): 1991: 137-145

The apparent diffusion coeff. (D) for ascorbic acid loss from peas calculated after blanching at 50, 60, 70, 80 and 90 C for 0, 2, 4, 6, 8 and 10 min ranged from 0.94×10^{-8} to $1.94 \times 10^{-8} \text{ m}^2\text{s}^{-1}$, having an activation energy of $18.71 \text{ kJ mol}^{-1}$ and confirmed that, if there was sufficient agitation of blanch water the leaching of ascorbic acid was controlled by diffusion only. SD

OILSEEDS AND NUTS

Groundnuts

Groundnut butter

559

Anon. **The production of peanut butter.** *Confectionery Production* 57(5): 1991: 378-381

The Fryma grinding and cooling plant ensures the production of a high quality peanut butter. BV

Madhuca

560

Ajay Singh and Singh (IS). **Chemical evaluation of mahua (*Madhuca indica*) seed.** *Food Chemistry* 40(2): 1991: 221-228

Seeds of mahua fruits contain 16.9 and 51.5% protein and oil, resp. Fatty acid composition of oil revealed the presence of oleic acid (46.3%) and linoleic acid (17.9%) as the major unsaturated and palmitic acid (17.8%) and stearic acid (14.0%) as major saturated fatty acids. The defatted mahua seed meal contains 29.4% protein and 9.8% saponins which are toxic at this level. However, the levels of saponins could be reduced by treatment with isopropanol. The defatted flour showed good oil absorption and emulsification properties. The solubility of protein was high at both acidic and alkaline pH with a min. at 4.0. The *In vitro* digestibility of mahua seed flour after treatment with isopropanol was found to be 81%. Polyacrylamide gel electrophoresis showed five bands with different relative mobilities and they contained both high and

low mol. wt. protein fractions. Detoxified mahua seed flour appears to be a good source of protein for food feed products. AS

Soybeans

561

Laszlo (JA). **Changes in endogenous and exogenous iron-reducing capability of soybean hull during development.** *Cereal Chemistry* 68(1): 1991: 21-24

Hulls (seed coats) of soybean (*Glycine max*) seeds contain relatively high levels of bioavailable iron. The presence of some iron in the Fe(II) oxidation state may be a contributing factor to its availability. Apparent Fe(II) and Fe(III) content of hulls of several soybean cultivars was followed throughout development. Iron was extracted from hulls with 2N HCl. Fe(II) and Fe(III) content of extracts was measured with bathophenanthrolinedisulfonic acid or by ion chromatography. Extracts of immature Century and Williams 82 hulls had higher levels of Fe(II) than fully mature hulls. Iron was all Fe(II) in extracts of Sooty, Wilson and Peking hulls from late growth stages (late linear seed fill to harvest maturity). Conclusive assessment of the *in situ* hull iron oxidation state was not possible because extracts of all cultivars and stages contained reductants that were endogenous to the tissue or were generated during extraction. These reductants may influence bioavailability to a greater extent than hull iron valence. AS

Soy products

Soy milk

562

Nsofor (LM) and Anyanwu (KB). **Effect of heat processing on refrigerated shelf-life of concentrated soy milk beverage.** *Journal of Food Science and Technology (India)* 29(1): 1992: 40-44

The refrigerated shelf-life of concentrated soy milk beverage processed with different heat treatments was evaluated. Visible coagulation time (shelf-life) of beverage decreased with increased concn. of its total solids. Heat sterilization alone or in combination with simmering generally produced instant coagulation in soy beverage of 32% total solids and short-life in beverages of 16 and 21% solids content. Combination of simmering and pasteurization produced visible coagulation time of 10 wks in 32% solids beverage stored in air-tight container. Linear correlation coeff. of -0.89 was deduced between visible coagulation time and pH of freshly coagulated beverage. Simmering plus

pasteurization generally produced lower pH at coagulation compared to other heat treatment combinations. AS

Soy proteins

563

Lapvetelainen (A), Kerrola (K) and Linko (R). **Effect of phytic acid hydrolysis on the functionality of soy protein isolate.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 71-75

The phytate of soy protein isolate was eliminated on a pilot scale using a new enzymatic method. In assessing the influence of the phytase treatment on the functionality of the soy protein, the solubility, water absorption, foaming and emulsifying properties of the phytate-free and the control isolate were evaluated in the range of pH 3.0 - 7.0. The overall changes in the functionality of the protein were small. The greatest differences between the isolates were detected at single pH-values, or at a narrow pH-range. The protein solubility in distilled water increased due to phytic acid hydrolysis at pH 3.0 and 3.5. The isolates clearly differed from each other in their water absorption capacity at pH 3.5 and 6.0. The elimination of phytic acid change the foam expansion capacity of 10% isolate dispersion only at pH 4.0. The differences between the isolates at pH 4.0 were smaller when the foam expansion was determined for 5% dispersion. The highest foam stability for control isolate was found at pH 3.0 and for phytate-free isolate at pH 6.0. The emulsion capacity increased due to enzymatic treatment at pH 3.0. Emulsion stability was the same in both isolates, except at pH 4.0. AS

564

Dahl (SR) and Villota (R). **Effect of thermal denaturation on the texturization of soybean protein via twin-screw extrusion.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991: 143-150

A twin-screw extruder was used to evaluate the texturization performance of thermally modified soybean flours, with nitrogen solubility indices (NSI) ranging from 80.0 - 8.6%. Heat processing resulting in NSI values between 35.4 and 23.7% was shown to decrease expansion and water absorption capacity and increase shear peak force of the finished product. Mild heat denaturation (57% NSI) resulted in products with excellent rheological and functional characteristics. GS

TUBERS AND VEGETABLES

Onions

565

Samaniego-Esguerra (CM), Boag (IF) and Robertson (GL). **Kinetics of quality deterioration in dried onions and green beans as a function of temperature and water activity.** *Food Chemistry* 24(1): 1991: 53-58

The kinetics of nonenzymic browning and thiosulphinate loss in dried onion flakes, and chlorophyll loss in dried green beans were studied as a function of temp. and a_w . Nonenzymic browning and chlorophyll loss were found to follow a zero-order reaction, while thiosulphinate loss followed a first-order reaction. Temp. dependence of the reaction rates could be described by the Arrhenius equation. a_w had an influence on the reaction rate constant and on the activation energy. Empirical equations were derived describing these relationships. Mathematical models were developed which successfully predicted the shelf lives of the dried products as a function of temp. and a_w . AS

Beet

566

Vaccari (G), Mantovani (G) and Campi (A). **Beet technological value under mediterranean storage conditions.** *Food Chemistry* 40(3): 1991: 241-249

Beet technological value, for a complete view of the consequences of storage, is determined by non-traditional parameters which relate better to the procedures of processing. Dry substance detn. and comp. of juice extracted at diffusion temp., storage of sound and damaged beets in piles/silo for a max. of 4 days between 20 - 35 C were considered and the results were found relevant to problems of short storage in warm, humid climatic conditions. SD

Carrots

567

Marques (JM), Rutledge (DN) and Ducauze (CJ). **Low resolution pulse NMR detection of the mobilization point of solutes during the drying of carrots.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 93-98

The decrease in the NMR free induction decay signal was studied in air-dried carrot samples. Between 5 and 20% water content, the proportion of slow relaxing components of the transverse relaxation shows a sharp increase, which must be due, to a great extent, to the mobilization of solutes. For the same range of water contents there is a change in

the relaxation mechanisms of the fast relaxing protons. Also, evidence of cross-relaxation phenomena is presented. Since the low resolution proton NMR response depends on the contribution of non-water protons, it is suggested that the state of water cannot be correlated as well absolute NMR values as with particular points observed in NMR parameters plots. A rapid NMR method (about 1 min per sample) adequate for the monitoring of industrial drying is presented. The method allows for the detn. of the mobilization point of solutes. At this point of a_w is around 0.02 units superior to that corresponding to the GAB monolayer value. AS

568

Grewal (KS) and Jain (SC). **Recovery and quality of juice from carrots subjected to heat and pectolytic enzyme treatment.** *Beverage and Food World* 17(1); 1990: 43-45

The juices from carrots heated in (a) 1% acetic acid solution, (b) boiling water (c) steam blanching prior to juice extraction, were compared with juice from raw (untreated) carrots. The results indicate that the yield of juice decreased when carrots were subjected to different heat treatments. It was 5.9% in (a), 13.7% in (b) and 9.8% in (c). The 0.5% level of pectolytic enzyme liquid conc. incubated at 37 C for 12 h showed max. recovery of juice from grated carrots. There was slight off-flavour probably due to acid development, oxidation and fermentation in the juice. SRA

Cassava

569

Balogopalan (C) and Padmaja (G). **Biochemical changes during the solid state fermentation of cassava under uncontrolled conditions.** *Journal of Root Crops* 15(1); 1989: 1-6

Effect of fermentation of cassava and cassava wastes under uncontrolled conditions enhanced the protein content upto 6.3 g/100 g DM in waste alone. 25% addition of cassava leaves increased the keeping quality and raised the protein content to 13.06% in the fermented product but addition of molasses showed no effect. SD

Cassava chips

570

Karuna (MS), Neelakantan (S) and Banumathy (P). **Feasibility of utilizing dried cassava chips for the manufacture of sago.** *Journal of Root Crops* 16(2); 1990: 76-82

Sundried chips of cassava M-4 (sweet) and H-165 (bitter) milled yielded 86.80 and 80.48% flour resp. The creamy white flour scored a reflectance value of only 77.030 and 76.396. The starch and fibre content were 80.825, 79.660 and 0.260 and 0.274% resp. for M-4 and H-165. After 7 washings the reflectance values were 98.57 and 99.10, starch 98.88 and 98.16, fibre 0.20 and 0.20, moisture 10.92 and 10.695, reducing sugar 0.077 and 0.063, total sugar 0.677 and 0.398, ash 0.470 and 0.470; protein 0.30 and 0.30, soluble nitrogen 0.01 and 0.01, phenolics 0.390 and 0.407% for M-4 and H-165 resp. conforming to ISI limits. SD

Potatoes

571

Lisinska (G) and Aniolowski (K). **Organic acids in potato tubers. Part 2. The effect of γ -irradiation on citric and malic acid contents of potato tubers.** *Food Chemistry* 40(2); 1991: 207-212

γ -irradiated potato tuber var. showed lower citric acid and higher malic acid levels than those not exposed to irradiation. Irradiated tubers stored for 6 months exhibited a markedly increased content of the citric acid. Irradiated tubers stored at 13 C, were higher in citric acid than those stored at 4 and 7 C. BV

572

Jaswal (AS). **Quality of French fried potato: Relationship to proteinaceous materials.** *Canadian Institute of Food Science and Technology Journal* 24(3/4); 1991: 151-155

Blanching and frying bear no relationship to the overall qualities of French fried potatoes. On a per g dry wt. basis, crude proteins of low sp. gr. (LSG) potatoes were found to be 98.1 mg of which 65.2 mg were in the true protein form. 19.7 mg as free amino acids and the remainder in the other non-protein nitrogenous form. The high sp. gr. potatoes showed 69.3 mg, 47.6 mg and 11.9 mg as compared to LSG potatoes. GS

Sweet potatoes

573

Mishra (S), Sinha (UP) and Sharma (HM). **Quality studies in sweet potato cultivars in relation to nitrogen fertilization.** *Journal of Root Crops* 16(2); 1990: 142-144

Effect of N (40, 80, 120 kg/ha) fertilization on 12 sweet potato cultivars grown in sandy loam soil with pH, 0.32% organic carbon, 32.51 kg/ha P_2O_5 and 211.7 kg/ha K_2O revealed that reducing sugar

decreased, starch, sucrose and protein per cent increased with increasing levels of N. Reducing sugar was high in 'RS-5' and 'hybrid-5', low in 'kalmegh'; sucrose high in 'pisa' and 'C-71', low in 'X-9' and 'H-96'; protein high in 'X-8', 'X-9' and 'X-6', low in 'kalmegh' and starch high in 'X-8', low in 'RS-5'. SD

Vegetables

574

Lahaye (M). **Marine algae sources of fibers. Determination of soluble and insoluble dietary fibre contents in some 'sea vegetables'.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 587-594

Seven marine algae wakame (*Undaria pinnatifida*), hijiki (*Hijiki fusiformis*), sea spaghetti (*Himanthalia elongata*), arame (*Eisenia bicyclis*), sea lettuce (*Ulva lactuca*), A O nori (*Enteromorpha* spp.), and nori (*Porphyra tenera*) were analysed for their soluble and insoluble dietary fibre contents. These sea weeds are rich in dietary fibres with total dietary contents varying between 32.7 and 74.6% (on a dry wt. basis) of which 51.6 to 85.0% are water soluble. GS

575

Srikanth (R) and Raja Papi Reddy (S). **Lead, cadmium and chromium levels in vegetables grown in urban sewage sludge - Hyderabad, India.** *Food Chemistry* 40(2): 1991: 229-234

Spinach, amaranthus and cabbage cultivated in sites of river Musi in which the sewage load of Hyderabad city is channeled showed that all leafy vegetables have accumulated higher amounts of Pb, Cd and Cr when compared to those from unpolluted areas indicating possible health hazard for consumers. SD

Cauliflowers

576

Goyal (M) and Mathew (S). **Physico-chemical characteristics of cauliflower dried under different drying conditions.** *Indian Journal of Nutrition and Dietetics* 27(2): 1990: 39-46

Cauliflower was dried without blanching and also after blanching for 3 min in boiling water (4:1) followed by sulphiting for 10 min in 1.0% potassium metabisulphite solution. Drying was done (i) under open sunlight, (ii) shade and (iii) in solar drier. The max. temp. in drier ranged from 50 to 60 C (plus or minus 5 C) during the winter season. The max. winter temp. under open sunlight and shade ranged from 22.2 to 25.8 C and 15 - 18 C resp. The max.

and min. rh during the drying period was 77 to 97% and 14 to 40% resp. Dried samples were analysed for proximate comp., ascorbic acid, water soluble sugar, tryptophan, Fe, P, Na, K and Ca contents. Blanching caused 32.0% loss in ascorbic acid and 13.9% loss of water soluble sugar. Blanching and drying methods did not significantly change the total ash, crude fibre, crude protein, crude fat and total carbohydrate and energy content of cauliflower. Shade dried cauliflower retained significantly higher amount of tryptophan than the open sun-dried and solar dried cauliflower. Unblanched samples scored less in sensory evaluation. Solar dried cauliflower scored more than open sun-dried and shade dried counterparts. The dried samples when packed in polyethylene bags and stored at room temp. for 12 months caused significant reduction in acceptability scores. The reduction was greater in unblanched cauliflower. It is concluded that blanching followed by solar drying gives good product with high nutritional quality. GS

Kenaf

577

More (DR), Pawar (VD), Deshpande (HW) and Nimkar (DJ). **Studies on selected functional properties of defatted whole and processed kenaf (*Hibiscus cannabinus* L.) seed flour.** *Journal of Food Science and Technology (India)* 29(1): 1992: 17-21

Selected functional properties of defatted whole and processed kenaf seed flour were studied. The dehulled flour contained highest protein (39.8%), lowest fibre (3.3%) and phytic acid (3.04%) compared to flours of cake and whole seed. The dehulled flour exhibited strikingly better functional properties and was comparable with those of soybean. The removal of seed coat fractions including fibre and phytic acid in dehulled flour improved the functional properties. The dehulled expeller press cake flour although showed improvements in some functional properties than whole flours, it was poor in nitrogen solubility, foaming and emulsion properties due to heat denaturation of proteins. AS

Leafy vegetables

Asparagus

578

Gairepy (Y), Raghavan (GSV), Castaigne (F), Arul (J) and Willemot (C). **Precooling and modified atmosphere storage of green asparagus.** *Journal of Food Processing Preservation* 15(3): 1991: 215-224

Effect of 3 precooling techniques, storage at 1.5 C under normal atm. with different rh and 3 different modified atm. (MA) storage on green asparagus revealed that precooling before storage reduced more than 20% losses, MA storage retained better colour, fresher appearance, firmer texture and less than 12% mass loss. In MA storage, silicon membrane adequately controlled CO₂ but to prevent anaerobic respiration O₂ was injected regularly. SD

Lettuce

579

Chikkasubbanna (V), Shankargowda Patil (KV), Jayaprasad and Poonacha (NM). **Effect of prepackaging and preharvest sprays of triacontanol on the storage life of lettuce (*Lactuca sativa* L.) cv. Great lakes.** *Indian Food Packer* 45(2): 1991: 45-51

Field grown lettuce were sprayed with triacontanol 0, 2, 4 and 6 p.p.m. once and twice with 15 and 30 days interval. After harvest they were packed in polyethylene bags of 100 gauge thickness and 45 cm x 32 cm size with ventilation of 0.20%. The packs were kept at 15.42 - 27.3 C for 8 days and observation were made for physiological loss in wt., ascorbic acid content, spoilage % and wilting. Prepackaging in sealed and perforated polyethylene bags reduced physiological loss in wt. by 0.3% to 3.06% and retained ascorbic acid in polyethylene bags with and without vent 43.01% and 38.57%, resp. Bacterial decay was observed in lettuce heads packed in polyethylene bags from 5th day of storage, and this decay was more in 0.20% ventilation. Triacontanol sprays slightly reduced the spoilage due to decay. In unwrapped lettuce wilting was observed instead of decay. The storage life of lettuce heads was only one day in unwrapped, whereas it was 7.08 and 6.50 days in those wrapped in polyethylene bags without vents and with 0.20% ventilation, resp. The interaction effect of prepackaging and triacontanol sprays was not significant. VKR

Tomatoes

580

Porretta (S). **Nonenzymatic browning of tomato products.** *Food Chemistry* 40(3): 1991: 323-335

Galacturonic acid, slowed down browning reactions by which it is possible to differentiate tomato products prepared by hot-break and cold-break technique with regard to non-enzymatic browning. SD

581

Sandhu (KS), Cheema (DS) and Surjan Singh. **Studies on the varietal differences in physico-chemical characteristics of some tomato varieties.** *Beverage and Food World* 17(1): 1990: 34-35

The selected 8 var. Ohio 7663, Rouita, Roma, EC 119190, EC 119197, EC 119192, EC 119193 and Pb-chhuhara) of tomato for marketable yield, physical characters and proximate comp. has been evaluated. They ranged between 106.21 to 284.08 quintals/hectare. The fruits of all var. were medium sized and deep red in colour. The juice recovered varied between 79.23 to 85.94%. The juice was bright red in colour. The chem. comp. of juice was total solids 4.93 - 5.83%, total soluble solids 4.5 - 5.0%, acidity 0.46 - 0.53%, ascorbic acid 10.20 - 17.82 mg, sugars - reducing 2.04 - 2.71% and total 2.19 - 2.73%; Pb-chhuhara was adjusted best for processing followed by EC 119197 among these varieties. SRA

Tomato juices

582

Efiuvwevwere (BJO) and Eka (AE). **Shelf and microbiological stability of acidified noninoculated and inoculated (*Alternaria tenuis*) tomato juice.** *Journal of Food Processing Preservation* 15(3): 1991: 159-165

Pasteurized tomato juice, control (C, initial pH 4.55) acidified-noninoculated (T₁) and acidified-inoculated (T₂) (both initial pH 4.00) were stored at 29 plus or minus 2 C for 28 days. T₁ and C attained appreciable microbial population, log₁₀ 7.5 and 6.9 cfu mL⁻¹ resp. and with similar trends in lactobacilli. Yeast count increased in all samples and in T₂ alternaria count and pH increased and total soluble solids decreased. The occurrence of mycelial mat and settling out of insoluble suspended solids in T₂ by day 16 was not noticed in C and T₁. SD

FRUITS

583

Whitefield (FB), Ly Nguyen (TH) and Last (JH). **Effect of relative humidity and chlorophenol content on the fungal conversion of chlorophenols to chloroanisoles in fibreboard cartons containing dried fruit.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 595-604

The fungal conversion of 2, 4, 6-trichlorophenol, 2, 3, 4, 6-tetrachlorophenol and pentachlorophenol to the corresponding chloroanisoles in fibreboard

cartons was studied under temp. and rh similar to those that could occur in shipping containers during transportation of packaged dried fruit (sultanas). Dried fruits were packed in cartons manufactured from virgin kraft fibreboard (total chlorophenol content $66 \mu\text{g kg}^{-1}$) and fibreboard prepared from recycled waste paper (total chlorophenol content $1375 \mu\text{g Kg}^{-1}$). Use of virgin fibre board ensured that the contamination of the fruit with chloroanisoles remains below their flavour threshold concn., by reducing the concn. of the precursor compounds. At 92% rh the concn. of trichloroanisole fruit packaged in virgin fibreboard was only half that necessary to cause the off-flavour. Thus, the concn. of the chloroanisoles in the packaged fruit increased with increasing rh. BV

584

Aina (JO) and Adesina (AA). **Quality attributes of jams from low-usage tropical fruits.** *Food Chemistry* 40(3); 1991: 345-351

High-solids jams prepared from African Star apple (*Chrysophyllum albidum*) and African plum (*Spondias mombin*) by open-kettle process showed fruit contents (43 - 45%), soluble solids (68.6 - 68.9%) reducing sugar (35.6 - 40.6%) and pH (2.80 - 3.40) being within comparable range. Jams showed storage stability at ambient conditions and sensory evaluation indicated preference to apple jams compared to the plum jams. SD

Apples

585

Chai (Y-L), Ott (DB) and Cash (JN). **Shelf-life extension of Michigan apples using sucrose polyester.** *Journal of Food Processing Preservation* 15(3); 1991: 197-214

The influence of SemperfreshTM (sucrose polyester) during cold storage of 'Golden Delicious', 'Ida Red' and 'McIntosh' apples showed retarded ripening with persistence green colour, increased tissue firmness and titratable acidity and comparable soluble solids. 'Golden Delicious' and 'McIntosh' apples showed better storage quality than 'Ida Red' apples. SD

586

Tsantili (E) and Knee (M). **Ripening of globster 69 apples after low-ethylene storage.** *Journal of the Science of Food and Agriculture* 54(4); 1991: 579-586

Apples were stored for upto 200 days in 2 kPa O₂ at 1.5 C with continuous ethylene removal. Fruits retained the ability to ripen normally after prolonged storage, synthesis of the aroma volatiles, 2 methyl

butyl acetate and hexyl acetate remained unimproved. Aroma synthesis, softening and pectin solubility required high ethylene levels for initiation, whereas losses of starch malate and chlorophyll occurred in untreated apples and were only accelerated by ethylene. Sugar changes seemed to be independent of ethylene. GS

587

Joshi (VK), Lal (BB) and Kakkar (KS). **Updating the technique of apple chops making and its utilisation.** *Beverage and Food World* 17(1); 1990: 21-22

Apple chops prepared from two var. were dipped in sulphur dioxide solution (2000 p.p.m.) for 60 min. or by sulphuring at 5 g/kg for 45 min. The products prepared from these treatments showed a shelf-life of 1 yr. The chops from 'Red-gold' apple var. showed higher nonenzymatic browning compared to those from 'Golden Delicious' apples. Samples treated with 1000 p.p.m. sulphur dioxide and in untreated ones, were found to be infested with almond moth (*Ephestia cautella*) after 2 month of storage. Chops could be used as snacks or converted into jam of acceptable sensory quality by the method reported in the paper. SRA

Apricots

588

Sharma (TR), Sekhon (KS) and Saini (SPS). **Studies on canning of apricot.** *Journal of Food Science and Technology (India)* 29(1); 1992: 22-25

Drained wt. in canned apricot increased with storage and had an inverse relationship with cut-out syrup. Varieties and treatments had their pronounced effects on drained wt. and texture. Acidification and addition of calcium chloride had a stabilizing effect on ascorbic acid content. Inclusion of calcium chloride in covering syrup greatly improved the texture and sensory scores. Var. suitable for canning are in the order of : 'Kaisha', 'Charmaghz', 'Suffaida' and 'Chuli', - the last one a wild var. had the max. acidity and was found unsuitable for canning due to its textural instability. AS

Avocados

589

Lozano (YF), Ratovohery (JV) and Gaydou (EM). **Compositional changes in triglycerides of avocado mesocarp associated with fruit development.** *Lebensmittel-Wissenschaft und -Technologie* 24(1); 1991: 46-52

Changes in triglyceride comp. of avocado (*Persea americana*) oil samples were followed during fruit development. Four stages of development were selected. The var. studied (Lula, Bacon, Fuerte, Zutano) were grown under mediterranean-like agroclimatic conditions. Intercorrelation among individual triglycerides (TG) was identified, and their relation to var. and stage of development were observed by analysing the data from 154 samples of avocado fruits with factorial discriminant analysis (FDA). This statistical technique showed a good partition of samples among the different stages examined. The first axis of FDA represented the maturity index for all var. For the same stage of development, the differentiation of var. is less precise with such a statistical technique. Nevertheless, the power of this technique based on the analysis of the TG was sufficient to lead to a correct classification for one stage. For the others, some misclassification occurred. Among the variables investigated only seven triglycerides remained essential. AS

Grapes

590

Dhillon (PS) and Sandhu (SS). **Effect of packaging treatments and SO₂ generator on the post-harvest losses of Perlette grapes.** *Indian Horticulture* 47(4): 1990; 376-381

Perlette grapes harvested in June 1986 were enclosed in polyliners having 0.56, 0.84, 1.12, 1.40 and 1.68% perforation. The field harvested grapes was packaged at 35 C. (field temp.) 30, 25, 15 and 5 C. Quarter size 'Dual release' SO₂ generator paper was placed in each polyliner. The polyliners and corrugated fiber board (CFB) cartons were kept in cold storage (0.3 C temp. and 85 - 90% rh) for 60 days. The sensory rating was highest for those packaged at 15 to 35 C with 1.12% perforation in the polyliner. The Brix⁰; acid ratio was also higher in those packaged at 35 C than at lower temp. The physiological wt. loss, berry shatter and rot were min. in 5 C packaging temp. and 0.56% perforation. Perlette grapes can be successfully stored upto 40 days by enclosing quarter size, 'Dual release' SO₂ generator in the polyliner having 1.12% perforation and packing at 35 C in the vented CFB. SRA

Jack fruit

591

Annapurna (SS), Ramadoss (CS) and Siva Prasad (D). **Characterisation of a trypsin/chymotrypsin inhibitor from jack fruit (*Artocarpus integrifolia*) seeds.** *Journal of the Science of Food and Agriculture* 54(4): 1991; 605-618

Jack fruit seed (*Artocarpus integrifolia* Hook f) trypsin inhibitor (JSTI) was found to be rich in acidic amino acids and devoid of free thiol groups. The N-terminal and C-terminal amino acids of JSTI were aspartic acid and serine, resp. The inhibitor was stable under conditions of extremes of pH (3.0 - 12.0), at high temp. and in the presence of denaturing agents. JSTI showed a non-competitive type of inhibition with K_i values of 0.48 plus or minus 0.17 nM and 0.16 plus or minus 0.04 nM for trypsin and chymotrypsin resp. The JSTI trypsin complex exhibited chymotrypsin inhibitory activity suggesting the 'double-headed' nature of the inhibitor. Chemical modification of lysine residues resulted in loss of trypsin and chymotrypsin inhibitory activities of JSTI indicating that amino groups are essential for activity. AS

Longan fruit

592

Bhattacharyya (AK), Liaquat Ali (S) and Mazumdar (BC). **Qualitative constituents of longan (*Euphoria longan* Steud) fruits during their developmental stages.** *Andhra Agricultural Journal* 37(2): 1990; 192-194

Lychee

593

Lee (HS) and Wicker (L). **Quantitative changes in anthocyanin pigments of lychee fruit during refrigerated storage.** *Food Chemistry* 40(3): 1991; 263-270

Mangoes

594

Ethiraj (S) and Suresh (ER). **Studies on the utilisation of mango processing wastes for production of vinegar.** *Journal of Food Science and Technology (India)* 29(1): 1992; 48-50

The possibilities of utilizing mango peels and stones for production of vinegar were explored. Direct fermentation yielded slightly more alcohol as compared to fermentation of cold or hot water extracts. Since the alcohol content in the base wine was less (2.5 to 3.5%) for vinegar production, it was raised to 5% either by fortification with alcohol or by secondary fermentation by addition of cane sugar. A good quality vinegar with 4.5 to 5.0% acetic acid and characterised by mild mango flavour was obtained. The simple batch type process required 3 to 12 days for completion depending upon the base wine. AS

595

Sanyal (D), Roychoudhury (R), Dhua (RS) and Mitra (SK). **Study of some mango cultivars of West Bengal.** *Indian Food Packer* 45(2): 1991: 29-33

Investigation carried out to evaluate the suitability of mango (*Mangifera Indica* L.) cv. ('Bangalora', 'Biswanath Chatterjee', 'Biswanath Mukherjee', 'Dashehari', 'Jehanara', 'Khasulkhas', 'Kohitoor', 'Krishnabhog', 'Langra Banarasi', 'Samar Bahist Chausa', 'Totapuri Red Small' and 'Zardalu') grown in the alluvial plains of West Bengal, India for processing indicated that 'Kohitoor' was superior to other cv. in fruit wt. (528.0 g), size and pulp wt. (413.0 g). Pulp recovery was highest in cv. 'Biswanath Mukherjee' (80.53%), and it was also lowest in peel (7.16%) and in stone (12.31%). 'Dashehari' fruit quality was superior to others with lowest moisture (76.2%) content. 'Langra Banarasi' contained max. ascorbic acid (42.5 mg/100 g of pulp) while 'Zardalu' and 'Biswanath Chatterjee' were rich in total phenol (7.83%) and β -carotene contents (20, 750 μ g/100 g). VKR

Papayas

596

Sepiah (M), Subki (A) and Lam (PF). **Fungicides for postharvest control of *Colletotrichum* spp. in eksotika papaya.** *ASEAN Food Journal* 6(1): 1991: 14-18

Two species of *Colletotrichum* were isolated from the fruit spots of eksotika papaya. *C. capsici* was found on 96% of infected fruit while *C. gloeosporioides* was found on 7% other fungi isolated less frequently were *Alternaria alternata*, *Botryodiplodia theobromae*, *Fusarium solani*, *Gibbertella pericaria*, *Phomopsis Caricae papayae*, *Cladosporium oxysporum* and *Ceratocystis paradoxa*. The effect of fungicides on radial growth indicated that prochloraz was superior to other fungicides (benomyl, carbendazim, chlorothalonil, propiconazole, thiabendazole) in inhibiting growth of both species of the *Colletotrichum*. The fruit spoilage by pathogens was effectively controlled by prochloraz and propiconazole. SRA

Sapota

597

Gautam (SK) and Chundawat (BS). **Effect of post-harvest treatments on biochemical changes in sapota cv. 'cricket ball'.** *Journal of Food Science and Technology (India)* 29(1): 1992: 53-54

Treatments with gibberellic acid 300 p.p.m., kinetin 100 p.p.m. and silver nitrate 40 p.p.m. slowed down

ripening by retarding the pre-climacteric respiration rate and ethylene production and through postponement of their activity peaks. These changes lead to reduced degradative metabolism in terms of catalase and PME activities and thus helpful in extending shelf-life of sapota fruits. AS

598

Gautam (SK) and Chundawat (BS). **Post-harvest changes in sapota cv. 'Kalipatti'. II. Effect of various post-harvest treatments on physico-chemical attributes.** *Indian Journal of Horticulture* 47(3): 1990: 264-269

Sapota (*Achras sapota*) var. 'Kalipatti' after harvest was treated with gibberellic acid (GA, 300 p.p.m.) for 20 min (T_1), kinetin (100 p.p.m.) dip for 20 min (T_2) and silver nitrate (40 p.p.m.) dip for 20 min (T_3) to extend the shelf-life and the treated fruits were ripened at ambient (28.2 - 39.2 C) temp. and 72 - 100% rh. Fruits treated with T_1 took max. 7.7 days to ripen followed by T_2 (6.7 days) and T_3 (6.2 days). Physiological loss in wt. was min. in T_2 , the titratable acidity declined slowly during the ripening period being most rapid in T_1 ; the ascorbic acid declined slower in T_2 and T_3 ; the starch level was max. in T_2 indicating delayed ripening by kinetin treatment. Total sugar content was highest in T_2 followed by T_1 . The pigment content increased rapidly in control attaining max. value in 96 h after harvest compared to 144 h in treated fruits (T_1 , T_2 and T_3). Carotenoid content was max. in T_1 followed by T_3 and T_2 . Among the three treatments dip in 300 p.p.m. GA was most effective. SRA

CONFECTIONERY, STARCH AND SUGAR

599

Kapil (V), Dodeja (AK) and Sarma (SC). **Lactose manufacture - a review.** *Indian Food Packer* 45(2): 1991: 52-62

The process involved in the manufacture of lactose: types of whey suitable for lactose manufacture; de-proteinization of whey; concn. of whey in conventional evaporators and by reverse osmosis, crystallization, and harvesting of lactose crystals; refining methods, yield and purity have been reviewed. 62 references. VKR

Confectionery

600

Jackson (EB). **The importance of sweeteners in confectionery production.** *Confectionery Production* 57(4): 1991: 300-301

The author highlights the production of hydrogenated sweeteners (sorbitol and maltitol) and their application in chocolate and sugarless confectionery. BV

601

Lees (R). **Fundamental principles in the production and characteristics of confectionery foam products. Part II. Confectionery Production** 57(4): 1991: 308-309

Starch

602

Marousis (SN), Karathanos (VT) and Saravacos (GD). **Effect of physical structure of starch materials on water diffusivity.** *Journal of Food Processing Preservation* 15(3): 1991: 183-195

Physical structures, created with hydrated granular/gelatinized starches and their mixtures with sugars/inert particles during air drying, were characterized by bulk porosity (estimated from the bulk and solid densities of samples) which influenced the water diffusivity. The water diffusivity in granular starches was reduced by mechanical compression, starch gelatinization/addition of water-soluble sugars inert particles/extrusion cooking caused higher water diffusivities due to higher porosities of starch/inert mixtures or expanded extrudates. SD

603

Sievert (D), Czuchajowska (Z) and Pomeranz (Y). **Enzyme-resistant starch. III. X-ray diffraction of autoclaved amylo maize VII starch and enzyme-resistant starch residues.** *Cereal Chemistry* 68(1): 1991: 86-91

X-ray diffraction was used to follow the development of crystallinity in amylo maize VII starch samples after repeated cycles of autoclaving and cooling. Changes in crystallinity were revealed by the development of reflections at 0.529 and 0.398 nm. Reduced intensities of a peak at 0.449 nm, which likely reflected the V pattern of complexed amylose, suggested that amylose-lipid complexes melted out during repeated autoclaving and cooling. Diffractograms of enzyme-resistant starch (RS) residues, isolated from amylo maize starch samples by treatment with Termamyl and amyloglucosidase, displayed single peaks at 1.662 and broad diffraction lines at 0.537 and 0.398 nm. The patterns suggested that chain fragments, packed in a B-type crystalline structure with a slightly enlarged crystal lattice, contribute to formation of RS from amylo maize starch. Structures resistant to enzymatic hydrolysis, as assessed by X-ray and differential scanning calorimetry measurements,

differed in crystallinity and resistance to thermal dissociation depending on the treatment of amylo maize starch. Differences in association between the chain fragments, presumably originating from amylose and varying proportions of interspersed, less-ordered segments, were assumed to account for these findings. Conditions applied for preparation of RS, such as type of amylolytic enzyme used in the isolation procedure, also affected thermal and crystallographic properties of RS. AS

BAKERY PRODUCTS

Bread

604

Addo (K), Pomeranz (Y), Huang (ML), Rubenthaler (GL) and Jeffers (HC). **Steamed bread. II. Role of protein content and strength.** *Cereal Chemistry* 68(1): 1991: 39-42

Twenty-nine hard wheat flours ranging in protein content from 9.3 to 14.4% and in specific pan bread volume ($\text{cm}^3/1\%$ protein) from 9.8 to 54.1 cm^3 and 34 soft wheat flours with protein content from 6.7 to 15.5% and specific pan bread volume from 14.9 to 74.1 cm^3 were compared in making pan bread and steamed bread under optimized conditions. Included in the evaluation were water absorption, mixing time, four alveograph parameters, and bread scores. Protein content was important in production of acceptable steamed bread (especially from low-protein soft wheat flours). High flour strength (as determined by physical dough tests) was desirable in production of pan bread (especially from high-protein hard wheat flours) and detrimental in production of steamed bread. A model using alveograph parameters and protein predicted 82.1% of the variability in pan bread volume potential of bread baked from hard wheat flours. Only 44.0% of the variability in steamed bread volume potential could be predicted from the protein content of soft wheat flours. AS

605

Yousif (AK), Morton (ID) and Mustafa (AI). **Functionality of date paste in breadmaking.** *Cereal Chemistry* 68(1): 1991: 43-47

Partial replacement of wheat flour with date paste (4 - 8%) modified bread dough as indicated by farinograph and alveograph studies. Addition of date paste decreased the malt index and delayed gelatinization. Total gas production and retention were improved by 4 - 6% addition compared with the sugar-free control. A higher concn. (12%) of date paste resulted in a negative effect on the gassing and handling properties of the bread dough. A good

quality bread with improved external and internal characteristics could be produced by a partial replacement of the wheat flour with 4% date paste. Increasing the date paste replacement level had an adverse effect on the crust and crumb colour of the bread produced, as shown by the scores for the bread supplemented with 8 and 12% date paste. Addition of 4 - 8% date paste as a wheat flour replacement to the bread formula significantly retarded firming of the bread crumb after two days' storage. Date paste also prolonged the shelf-life of breads. AS

606

Neyreneuf (O) and Plaat (JBVD). **Preparation of frozen French bread dough with improved stability.** *Cereal Chemistry* 68(1): 1991: 60-66

Optimizing the properties of French bread dough through prolonged frozen storage is difficult because the dough is prepared from a simple recipe to which few additives are permitted. The parameters that directly influence the properties of such doughs was analyzed. At the formulation stage, a specific compressed yeast with "reduced activity" was found to contribute greatly to dough stability. This benefit was largely lost when this yeast was converted to different instant-dry forms. An adequate protein content in the bread flour and a carefully formulated bread improver were shown to be important in optimizing the gas retention properties of frozen doughs. At the mixing stage, conditions that gave full dough development without inducing the start of gas production by the yeast improved dough stability. The addition of prefermented doughs was contraindicated, whereas delayed incorporation of the yeast and a relatively low dough temp. were shown to be advantageous. An outline production process incorporating the positive findings is presented. AS

607

Berglund (PT), Shelton (DR) and Freeman (TP). **Frozen bread dough ultrastructure as affected by duration of frozen storage and freeze-thaw cycles.** *Cereal Chemistry* 68(1): 1991: 105-107

Cryogenic preparation of frozen bread dough permitted examination of changes in ultrastructure by low-temp. scanning electron microscopy (SEM). Doughs examined after mixing and frozen doughs, thawed during SEM preparation, exhibited a reticular pattern. After mixing and 24 h frozen storage, starch granules appeared firmly embedded in the gluten network, which was mostly intact. Some starch granules exhibited internal damage and were more separated from the gluten matrix after 24 wks of frozen storage and freeze-thaw cycles. When doughs were kept frozen during SEM

preparation, the reticular pattern was not apparent. After 24 wks frozen storage and freeze-thaw cycles, doughs that were kept frozen during SEM preparation had less free water distributed throughout the sample. In these doughs, less water appeared to be associated with the gluten matrix and starch. Patches of ice were observed in samples kept frozen during SEM preparation. The observed changes in ultrastructure may help explain the extended proof times and reduced loaf volumes of frozen bread dough. AS

608

Sanders (SW). **Using prune juice concentrate in whole wheat bread and other bakery products.** *Cereal Foods World* 36(3): 1991: 280-281, 283

Prune juice conc. can serve as a natural preservative in yeast-leavened baked products. With its other attributes of natural colour, dough strengthening, flavour enhancement, sweetening and humectancy it could be considered as a multi-purpose ingredient in foods. BV

Cakes

609

Lee (CC), Johnson (LA), Love (JA) and Johnson (S). **Effects of processing and usage level on performance of bovine plasma as an egg white substitute in cakes.** *Cereal Chemistry* 68(1): 1991: 100-104

The effects of processing and level used on the performance of bovine plasma replacing egg whites in cakes were investigated. Plasma was evaluated in high-ratio, white layer cakes in different forms (fresh, frozen and spray-dried) at 5 levels (50, 75, 90, 100 and 110% of the normal protein level when using egg whites). An enzyme-hydrolyzed 90/10 blend of plasma and beef stock was also evaluated. Cakes made with plasma had slightly less vol., less crowning profile, and darker crust colour than cakes made with equivalent amounts of egg white protein. Also, those cakes were softer, less chewy and less springy but were similar in cohesiveness and gumminess to those made with egg whites. Nearly equivalent performance was achieved by replacing 1.0 parts of egg whites with 1.1 parts of plasma. There were few differences in performance among fresh, frozen, and spray-dried plasma. Hydrolyzed plasma-beef stock blends gave cakes with higher vol. but darker crust colours than plasma. AS

Dough

610

Collar (C), Mascaros (AF), Prieto (JA) and de Barber (CB). **Changes in free amino acids during fermentation of wheat doughs started with pure culture of lactic acid bacteria.** *Cereal Chemistry* 68(1); 1991: 66-72

Dynamics of free amino acid levels during fermentation of wheat bread doughs started with 3 strains of lactic acid bacteria species - *Lactobacillus brevis* (B33), *L. plantarum* (B39), and *Enterococcus faecium* (B40) - were investigated by reversed-phase HPLC of the dansyl amino acids. 20 protein amino acids, γ -aminobutyric acid, and ornithine were quantified in doughs fermented 0, 4, and 24 h with lactic acid bacteria. Changes were related to the nutritional requirements proteolytic activities developed by these microorganisms. Nutritional requirements of lactobacilli and enterococcus for glycine were evidenced at the beginning of fermentation (0 - 4 h), whereas asparagine was consumed later (4 - 24 h). In addition, B33 metabolized glutamine and serine first, and aspartic acid, glutamic acid, γ -aminobutyric acid, tryptophan, and proline later; alanine was assimilated during the entire fermentation (0 - 24 h). B39 showed preferential uptake of aspartic and glutamic acids, glutamine, serine, alanine, ornithine and threonine. Exoproteolytic activity of microorganisms was revealed by the rise in levels of some protein amino acids. During fermentation (0 - 24 h), valine, leucine and lysine gradually increased; however, in all doughs proline content increased only during the first 4 h. Aspartic acid and histidine were accumulated only in doughs fermented with B40. Methionine and tryptophan accumulated in doughs fermented with B39 and B40. The degree and rate of proteolysis during fermentation were higher for bread doughs containing B40. For the strains of lactic acid bacteria considered, changes in γ -aminobutyric acid were connected to changes in glutamic acid. Higher amounts of ornithine in doughs fermented long times were presumably due to its release by microorganisms. AS

611

Brummer (JM). **Modern equipment for sourdough production.** *Cereal Foods World* 36(3); 1991: 305-308

This feature article deals with descriptions of the equipment used in small and large scale bakeries, economic information of sour sough production equipment, recommended formulation and sour dough starters. BV

612

Brummer (JM) and Lorenz (K). **European developments in wheat sourdoughs.** *Cereal Foods World* 36(3); 1991: 310-312, 314

The changes in wheat sour dough prepared with different absorption, dough temp., type and amount of culture were studied. High absorption, high dough temp. and intermediate amount of culture and use of 7.5 to 10.0% of the wheat flour in the sourdough will produce a pleasantly aromatic wheat bread. BV

Tortillas

613

Bello (AB), Serna-Saldivar (SO), Waniska (RD) and Rooney (LW). **Methods to prepare and evaluate wheat tortillas.** *Cereal Foods World* 36(3); 1991: 315, 317-318, 321-322

Laboratory procedures to prepare and evaluate hot-press wheat tortillas were developed. Equipment conditions and quality parameters at each stage of processing were optimized. Water absorption and mixing time of tortilla dough were determined with a farinograph using about 54% water absorption and centering the curve at 750 FU. A pliable dough with good machinability resulted. Shortening decreased the water absorption and increased the mixing time of tortilla dough. Optimum resting time for tortilla dough balls was 20 min at 60 - 70% rh and 32 C. Shorter resting times yielded underbaked tortillas with small diameter and roughened surfaces, while longer resting times yielded irregularly shaped tortillas. Hot-press platen temp. of 218 C (top) and 204 C (bottom) and a 1.8 mm gap yielded uniformly shaped tortillas. Tortillas with good appearance were obtained when raw tortilla discs were baked at 232 - 271 C for 40 s. Tortillas were cooled to <30 C before packaging to prevent the tortillas from sticking together and to limit moisture condensation inside the package. Baked tortillas containing 11 - 13% shortening, 1.0 - 2.0% baking powder, and 1.5% salt were uniformly puffed and layered. Chemical, physical and textural properties of these tortillas were similar to those of commercial wheat tortillas. AS

MILK AND DAIRY PRODUCTS

614

Maubois (JL). **New applications of membrane technology in the dairy industry.** *Australian Journal of Dairy Technology* 46(2); 1991: 91-95

This review article considers recent improvements in microfiltration membranes applications in such as microbial purification of milk by tangential microfiltration, standardisation of proteins in milk with ultrafiltration or microfiltration, use of membranes in cheese technology, milk fractionation and membrane fermentation reactors. 25 references. BV

Milk

615

Zmarlicki (S), Yuan (TCJ) and Richardson (GH). **Improved estimations of total and psychrotrophic microflora in raw milk using reflectance colorimetry at 32 C.** *Journal of Food Safety* 11(3): 1991: 189-196

A reflectance colorimeter with 32 C incubation/detection temp. successfully quantitated total and psychrotrophic microflora in raw milk. Correlations between reflectance colorimetry and the Standard Plate Count improved with preliminary incubation time: .50 (no preliminary incubation), .74 (24 h at 7 C), to .84 (48 h at 7 C). Correlations between reflectance colorimetry and the Psychrotrophic Bacterial Count were better than those achieved with the Standard Plate Count and improved: .53 (no preliminary incubation), .80 (24 h at 7 C), to .91 (48 h at 7 C). The 48 h to 72 h preliminary incubation method would cost less and data would be available in 48 to 72 h compared to the 98 to 240 h for psychrotrophic plating methods. A second sample set (no preliminary incubation) could be analyzed to identify high-count samples in less than 24 h. Colour detection times following sample refrigeration for 24 h at 0, 4 and 7 C were significantly different from samples tested before refrigeration. Identical sample time/temp. storage conditions are suggested. AS

616

Reddy (KK), Nguyen (MH), Kailasapathy (K) and Zadow (JG). **The effect of some treatments and storage temperatures on UHT whole milk.** *Australian Journal of Dairy Technology* 46(2): 1991: 57-63

The evaluation of the effects of low-temp. inactivation (LTI) treatment and addition of sodium hexametaphosphate (SHMP 0.1%) to raw milk with higher bacterial count has been done. The quality of aseptically processed and packaged milk at three temp. of storage i.e. room (20 - 22 C), 37 C and refrigerated (4 - 6 C) for a period of 6 months was also studied. The lipolytic and proteolytic activities in the milk during storage were also observed. LTI treatment is effective in inactivating the enzymes as

observed by reduced free fatty acid content and proteolysis. Higher temp. of storage are not ideal for the shelf-life of UHT milk. GS

617

Dharampal. **Technological innovations in the manufacture of special milks.** *Beverage and Food World* 17(1): 1990: 13-16

The technological aspects and advantages in manufacture of special milks such as dietetic milks, cost, scarcity, utilisation of by-products, diversification of market milk industry, classification of special milks (plain special milk, reconstituted milks, toned milks, recombined milks), flavoured milks (artificially flavoured, chocolate flavoured, chocolate and fruit flavoured milks and milk beverages), vegetable solids-based milks (filled milk, imitation milk and soy milk) have been discussed. SRA

Milk products

618

Oakenfull (DG), Pearce (RJ) and Sidhu (GS). **Low-cholesterol dairy products.** *Australian Journal of Dairy Technology* 46(2): 1991: 110-112

Describes a process (SIDO AKTM process) developed by CSIRO Australia for producing low-cholesterol dairy products of cheaper and better quality. Covers the SIDO AKTM process, principle of operation, advantages of the SIDO AKTM process and safety and regulatory status of β -cyclodextrin. GS

Burfi

619

Patil (GR), Patel (AA), Garg (FC) and Rajorhia (GS). **Instrumental characterization of burfi texture.** *Australian Journal of Dairy Technology* 46(2): 1991: 64-68

Texture of burfi (soft or pistachio, and hard or plain), an Indian whole milk-based sweet, was measured by the Instron machine using different test conditions and the instrumental data compared with sensory texture descriptors. Soft burfi was typically moderate in firmness, high in crumbliness and low in elasticity, chewiness and smoothness, whereas hard burfi was markedly more firm, more crumbly and less sticky. Sensory firmness was corroborated by Instron hardness and deformation energy, and stickiness by adhesive force. Instron test conditions, viz., the degree of compression and, to a lesser extent, the speed of compression significantly influenced the texture profile parameters of both types of burfi. Hardness, deformation energy,

gumminess, chewiness, adhesive force and permanent area change increased as the degree of compression increased but the degree of elasticity decreased with increasing compression. Recoverable energy and cohesiveness first declined and then increased as compression progressed. Springiness of hard burfi generally showed a steady decline as the degree of compression increased, but that of soft burfi tended to increase, then decrease and finally increase again. The two types of burfi could be differentiated better when Instron measurements were carried out at higher (70 - 80%) compression using 20 mm.min⁻¹ speed. AS

Cheese

620

Esteban (MA), Marcos (A), Alcala (M) and Gomez (R). **Calculation of water activity in surface mould-ripened soft cheeses from their chemical composition.** *Food Chemistry* 40(2): 1991: 147-157

The following linear regression and multiple linear regression equations between salt (NaCl), ash and non-protein nitrogen (NPN) to a_w (av. of measurements by psychrometric, cryoscopic, dew-point hygrometric and isopiestic equilibration methods) $a_w = 0.9813 - 0.0045 [\text{NaCl}]$; $a_w = 0.9769 - 0.0019 [\text{ash}]$; $a_w = 0.9793 - 0.0101 [\text{NPN}]$; $a_w = 0.996 - 0.0029 [\text{ash}] - 0.0106 [\text{NPN}]$ can be used singly or in combination to predict the a_w of surface mould-ripened soft cheeses. SD

621

Gangopadhyay (SK) and Thakar (PN). **Milk coagulant retention in Mozzarella cheese and curd.** *Australian Journal of Dairy Technology* 46(2): 1991: 49-52

The detn. of the influence of various manufacturing parameters (draining acidity of whey, type of milk, temp. of moulding water used for plasticizing the curd; method of acidification and type of rennet) on the level of residual milk coagulant remaining in curd and in Mozzarella cheese from buffalo milk has been studied. The influence of such retention of coagulant on proteolysis of cheese during storage has also been studied. GS

622

Tukan (SK) and Humeid (MA). **Salt and moisture relationships in brined cheese.** *Australian Journal of Dairy Technology* 46(2): 1991: 85-87

Forty seven white brined cheese samples and their original brines representing Akkawi, Braided, Feta and Nabulsi cheese were analyzed for moisture and salt contents at equilibrium. Detailed chemical

analysis was also performed on eleven of these samples. Correlation was high ($P < 0.001$) between salt in brine and salt in cheese, and between salt in brine and moisture in cheese. Two useful regression equations were derived for the prediction of salt in cheese. The first employs salt concn. in brine and moisture in cheese whereas the second employs only salt concn. in brine. Results showed the possible applicability of the equations for different types of brined white cheese. It was demonstrated that detn. of salt in brine through analysis of sodium or chloride is suitable for the use of the equations, whereas methods depending on collective properties such as sp. gr. are not useful since brine contains other soluble substances. AS

Cheddar cheese

623

Kanawjia (SK) and Singh (S). **Factors affecting compositional quality of Cheddar cheese from buffalo milk.** *Journal of Food Science and Technology (India)* 29(1): 1992: 36-39

Among the casein/fat (C/F) ratios studied, 0.65 to 0.70 was found to be optimum to enhance the moisture retention in Cheddar cheese made from buffalo milk. The yield, moisture and total solids retention in cheese were higher as compared to those obtained from highest C/F ratio (0.75) milk. Max. yield, moisture retention and total solids recovery were obtained at a higher temp. of 165 F. Homogenization improved yield, moisture retention and recovery of total solids in cheese. Among the different additives, pectin gave a superior product. The yield and moisture retention were max. in pectin added cheese. AS

Cheese-whey

624

Leiras (MC), Chirife (J) and Alzamora (SM). **Development of a shelf-stable hydrolyzed concentrated cheese whey.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 12-16

Concentrated cheese whey (50% total solids) was enzymatically hydrolysed (about 65 - 70% lactose hydrolysis) and the resultant whey had a a_w of 0.90. Adjustment of pH to 5.0 together with the addition of 0.2% potassium sorbate or 0.2% calcium propionate (or 0.1% of each one) results in a whey which can be stored upto 3 months without refrigeration. Microbial evaluation showed that none of the microorganisms (*Staphylococcus*, yeasts and molds) inoculated were able to grow in any of the modified hydrolysed concentrated cheese whey samples after 3 months of incubation. BV

Mozzarella cheese

625

Thaker (DN), Gangopadhyay (SK) and Miyani (RV). **Influence of manufacturing parameters on rheology of Mozzarella cheese made from buffalo milk.** *Australian Journal of Dairy Technology* 46(2): 1991; 53-56

The rheological properties of buffalo milk Mozzarella cheese has been related to the manufacturing variables such as acidity of whey at draining, type of milk (raw or heated), plasticizing treatment of curd, method of milk acidification (starter or direct acidification) and type of rennet using an Instron compression test. GS

Chhana

626

Deasi (HK), Gupta (SK), Patil (GR) and Patel (AA). **Textural properties of market chhana.** *Journal of Food Science and Technology (India)* 29(1): 1992; 30-32

Instron hardness, cohesiveness, gumminess and chewiness varied significantly in chhana samples collected from different suppliers. Correspondingly, significant variations were also noted in sensory firmness, crumbliness, chewiness and smoothness. Chhana having sensorily most acceptable textural properties was fairly smooth but sticky, and low in firmness, elasticity, crumbliness and chewiness. Variations in textural characteristics appeared to be related, to some degree, to significant variations in pH, and to a lesser extent, to the moisture content. AS

627

Goyal (GK). **Influence of packaging and types of chhana on the water vapour transmission rate of flexible packages.** *Journal of Food Science and Technology (India)* 29(1): 1992; 55-56

Water vapour transmission rate (WVTR) of flexible packages increased with the increase in storage temp. The change in WVTR of the packages was significantly affected by the duration of storage and the type of chhana packaged. AS

Kheer

628

Niturkar (PD), Doke (VS), Joglekar (NV) and Rotte (SG). **Studies on the formulation and quality**

attributes of milk protein based vermicelli (Seviah) for Kheer-like product. *Journal of Food Science and Technology (India)* 29(1): 1992; 33-35

Studies on the formulation and evaluation of quality attributes of vermicelli with 2, 4 and 6% milk protein fortification in semolina and white flour were conducted. As the level of milk protein fortification was increased, the water required for dough formation got decreased and time for dough development and extrusion increased. Fortification of milk protein increased the vermicelli thread length with improvement in colour and texture. An improvement in sensory qualities of vermicelli was brought about with 4% milk protein fortification in either of the wheat flour fractions. Higher scores for sensory attributes including flavour, taste and acceptability were recorded. An increase in the protein level by 15.77 and 16.18% in semolina and white flour vermicelli at 6% milk protein fortification resulted in a decrease of 70.34 and 69.63% resp. in the total carbohydrate content. AS

Khoa

629

Sawhney (IK), Patil (GR) and Bikram Kumar. **Studies on water activity modification in heat concentrated whole milk product 'khoa' using propylene glycol.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991; 6-8

The effect of propylene glycol addition on moisture sorption isotherms of khoa was studied for propylene glycol concn. of 0, 2, 4, 6 and 8% wt./wt., wet basis. Experimental data on isotherms were fitted to a GAB model. At all water activity levels in the range of 0.6 - 0.97, the equilibrium moisture content of khoa increased with the increasing level of propylene glycol. The monolayer moisture content also increased on addition of propylene glycol. The mathematical relationships between GAB constants and propylene glycol concn. were established to predict water activity of khoa at a given concn. of propylene glycol. The effect of propylene glycol addition on Gibbs free energy change is discussed. AS

Milk powder

630

Singh (S) and Kanawjia (SK). **Effect of coagulation temperatures and total solid levels on quality of paneer made from whole milk powders.** *Journal of Food Science and Technology (India)* 29(1): 1992; 57-59

Whole milk powder was utilized to prepare paneer of acceptable quality, so that this acid coagulated milk product is available around the yr. Acceptable quality paneer was obtained from milk having 15% total solids and coagulated at 85 C. Experimental paneer compared well with the control. AS

Wheys

631

Dionysius (DA), Herse (JB) and Grieve (PA). **Extraction of lactoperoxidase and lactoferrin from whey using batch ion exchange techniques.** *Australian Journal of Dairy Technology* 46(2); 1991: 72-76

The extraction of lactoperoxidase and lactoferrin from whey using batch ion exchange chromatography was studied under various conditions. Maximal recovery of the two proteins from Cheddar cheese whey at pH 7 was achieved using CM-Sephadex resin with a 60-min binding time. Under these conditions almost 80% of the lactoperoxidase and greater than 90% of the lactoferrin present in the starting whey were recovered from the resin following desorption with NaCl. When the effects of whey pH, conductivity and type were studied, the following findings were observed: whey pH in the range 5 to 9 gave good recoveries of both lactoperoxidase and lactoferrin, but contaminating proteins bound at pH 5; whey conductivity significantly affected the adsorption of lactoperoxidase but not lactoferrin; and cheese whey (Cheddar and pizza) yielded better recoveries of lactoperoxidase than rennet and acid wheys, but lactoferrin recovery was largely unaffected by whey type. AS

632

Houlihan (AV) and Goddard (PA). **Analysis of a milk membrane fraction isolated from whey protein concentrates.** *Australian Journal of Dairy Technology* 46(2); 1991: 77-81

The protein and lipid comp. of lipoprotein complexes formed during the processing of whey protein conc. (WPC) have been analysed. WPC contains lipoprotein complexes of membrane origin i.e. from the skim milk membrane (SMM) system in which β -lactoglobulin and α -lactoglobulin have been incorporated during heat processing. GS

633

Pearce (RJ) and Marshall (SC). **New ways with whey components.** *Australian Journal of Dairy Technology* 46(2); 1991: 105-107

Information relating to use of whey components in foods; new ways of whey processing; role of microfiltration to reduce residual fat level in whey protein conc. and increase of protein levels and improvement in functional properties; and demineralisation techniques are discussed. BV

Milk proteins

634

Gothwal (PP) and Bhavadasan (MK). **Browning and aggregation of milk proteins.** *Journal of Food Science and Technology (India)* 29(1); 1992: 26-29

Heating of milk was found to change the separation pattern of casein through Sephadex G-200 gel chromatography. Generally, the proportion of high mol. wt. protein fraction increased with a concomitant decrease in low mol. wt. protein fraction on increasing the severity of heat treatment. The study showed that heating conditions which resulted in higher browning in milk would also lead to increased polymerisation of proteins. Like browning, polymerisation of casein was considerably higher in buffalo milk than in cow milk under identical conditions of heating. Gel filtration studies showed that polymerisation of casein during heating of milk increases with increased levels of proteins or lactose or increase in pH. These factors also enhanced browning in milk. The extent of polymerisation of casein caused by these factors was higher in buffalo milk than in cow milk. AS

Caseins

635

Leitaer (E), Poiffait (A) and Adrian (J). **Studies on the interaction between casein and vitamin A.** *Lebensmittel-Wissenschaft und -Technologie* 24(1); 1991: 39-45 (Fr)

Casein forms all combine with retinol and retinal primarily through hydrophobic interaction due to the intermediary function of the aromatic amino acids. However, about 13% of the vitamin A is chemically bound to the casein. This bond is broken following saponification. AS

MEAT AND POULTRY

636

Fung (DYC) and Liang (C). **Critical review of isolation, detection and identification of yeasts from meat products.** *CRC Critical Reviews in Food Science and Nutrition* 29(5); 1990: 341-379

637

Prabhakar (K), Govindarajan (CV) and Shanmugam (AM). **A study on certain qualitative changes in glycerol, glycerol-nitrite and nitrite based intermediate moisture meats.** *Journal of Food Science and Technology (India)* 29(1); 1992; 62-64

Three types of intermediate moisture (IM) meats based on (i) glycerol (ii) glycerol-nitrite and (iii) nitrite were prepared by equilibration in their respective infusion solutions followed by oven heating and air-drying. Certain qualitative changes were studied in the IM samples during two-month ambient temp. storage along with frozen-stored unprocessed samples. Higher pH was noticed in nitrite and glycerol-nitrite based IM samples. Frozen-stored samples recorded a a_w of 0.98 compared to 0.85 in IM samples with non-significant changes during storage. Frozen stored samples and IM samples revealed total water of 73.98 and 41.10 to 43.91% before cooking and 60.51 and 57.12 to 57.17% after cooking and bound water of 43.28 and 30.29 to 34.76% before cooking and 48.76 and 46.05 to 46.61% after cooking resp. AS

638

Prabhakar (K), Govindarajan (CV), Kosalarman (VR) and Shanmugam (AM). **Colour and related quality changes in intermediate moisture meats.** *Journal of Food Science and Technology (India)* 29(1); 1992; 65-67

Glycerol, glycerol-nitrite and nitrite based intermediate moisture (IM) meats were prepared by 24 h equilibration, oven-heating and air-drying to evaluate colour and related qualitative characteristics during storage at ambient temp. for 2 months in comparison to unprocessed frozen samples. Frozen stored samples recorded the lowest Munsell hue values (colour towards red hue). Glycerol and glycerol-nitrite based IM samples revealed higher hue values (19.57 and 19.0 resp.) indicating a change in sample colour towards yellow hue after processing. Munsell value was higher in the frozen-stored and glycerol-based IM samples than in glycerol-nitrite and nitrite based IM samples. Among cooked samples, hue was lower (towards red range) in nitrite based IM samples than others (towards yellow red range). Total pigment content and solubility in pyridine were highest in frozen stored samples followed by nitrite, glycerol-nitrite and glycerol based IM samples in that order. AS

639

Correia (LR) and Mittal (GS). **Gelation kinetics of meat emulsions containing various fillers during cooking.** *Journal of Food Process Engineering* 14(1); 1991; 35-49

A cylindrical shaped thermal scanning rigidity monitor (TSRM) was developed to determine shear rigidity modulus of meat batters during cooking. A meat fat-protein ratio of 1.8, moisture content of 62% and 8.6% filler were used. The fillers were buttermilk powder, corn starch, micro-crystalline cellulose, modified corn starch, modified wheat flour, soy-protein conc. and whey-protein conc. Plots of rigidity modulus versus product-temp. showed two major thermal transitions. The first and most important transition (53 to 61 C) was due to myosin gelation. The second transition (64 to 69 C) was ascribed to the collagen softening. The max. rigidity-temp. slopes of 0.60 to 1.02 kPa°C occurred after the first transition. AS

640

Farmer (LJ) and Patterson (RLS). **Compounds contributing to meat flavour.** *Food Chemistry* 40(2); 1991; 201-205

641

Kim (H-J) and Taub (IA). **Specific degradation of myosin in meat by bromelain.** *Food Chemistry* 40(3); 1991; 337-343

Bromelain, an inexpensive enzyme was found more advantageous than papain to degrade myosin without affecting action in meat and useful for making good quality, shelf-stable, freeze-dried meat products. SD

Beef

642

Ali (MS) and Fung (DYC). **Occurrence of *Clostridium perfringens* in ground beef and ground turkey evaluated by three methods.** *Journal of Food Safety* 11(3); 1991; 197-203

643

Greer (GG) and Jones (SDM). **Effects of lactic acid and vacuum packaging on beef processed in a research abattoir.** *Canadian Institute of Food Science and Technology Journal* 24(3/4); 1991; 161-168

Poultry

Chickens

644

Tsal (H-CS) and Slavik (MF). **Rapid method for detection of *Salmonellae* attached to chicken skin.** *Journal of Food Safety* 11(3): 1991: 205-214

A rapid, sensitive nitrocellulose membrane lifting technique was developed to identify *Salmonella typhimurium* attached to chicken skin. Basically, this method used a nitrocellulose membrane to remove salmonellae attached to chicken skin. The membrane with attached salmonellae was then incubated on xylase lysine deoxycholate (XLD) agar for 18 h at 37 C. Appearance of black colonies on the white membrane was considered a positive presumptive test for salmonellae. Immunostaining of colonies on the nitrocellulose membrane was then used to confirm presence or absence of salmonellae. This technique can be used to identify salmonellae contamination of chicken skin in less than 24 h and was shown to be more sensitive than presently used swabbing or washing techniques. AS

Quail

645

Prabhakara Reddy (K), Narahari (D) and Alfred Jayaprasad (I). **Influence of sodium tripolyphosphate (STPP) treatment on fractionation of Japanese quail (*Coturnix coturnix* - Japonica) muscle proteins.** *Journal of Food Science and Technology (India)* 29(1): 1992: 60-61

Ready-to-cook Japanese quail carcasses of either sex were dipped in 0, 3 and 6% STPP for 3 and 6 h and stored at 4 plus or minus 1 C for 0, 72 and 144 h or were frozen (-18 plus or minus 1 C) and stored for 30 and 60 days. STPP dip of Japanese quail carcasses significantly increased the water and salt soluble protein fractions and had no effect on changes in the non-protein nitrogen content. Different storage periods had also significantly influenced the water and salt soluble protein fractions, but not the non-protein-nitrogen content of the quail meat. Dipping of carcasses for 6 h in STPP solution increased the water soluble protein. AS

White leghorn cockerels

646

Pandey (NK) and Shyam Sunder (G). **Carcass characteristics, meat yields and**

physico-chemical properties of meat from white leghorn cockerels. *Indian Journal of Poultry Science* 25(4): 1990: 249-252

The carcass characteristics, meat yield and physical and chemical characteristics of meat of White Leghorn cockerels of 8, 10 and 12 wk of age were studied. Live wt. and dressed carcass wt. increased significantly with increasing age. The unit increase in live and dressed wt. was more between 8 and 10 wk than 10 and 12 wk of age. Dressing % was higher at 8 and 12 wk than at 10 wk of age. Blood loss during processing did not change with age whereas feather loss was significantly less at 12 wk of age. The yields of liver, gizzard and heart were higher at 10 wk and liver and gizzard yields remained constant thereafter till 12th wk. The yield of deboned meat, total meat and skin % was higher at 8 wk than at 10 or 12 wk. Age did not significantly influence the water holding capacity, protein, fat and ash contents. Sarcoplasmic and myofibrillar proteins, non-protein N and cooking loss and shear values of breast and leg muscles were significantly lower at 8 wk than at 10 or 12 wk of age. The overall performance, meat yield and quality characteristics were better at 8 wk which is the optimum slaughter age. SRA

SEAFOODS

647

Stammen (K), Gerdes (D) and Caporaso (F). **Modified atmosphere packaging of seafood.** *CRC Critical Reviews In Food Science and Nutrition* 29(5): 1990: 301-331

This review examines the safety of modified atm. packaging (MAP) of seafood through analysis and comparison of raw materials, research methodologies, quality indices, treatment and packaging options. Aspects covered include: the seafood spoilage, carbon dioxide and microbial inhibition, analytical methods (microbiological analysis, chemical and biochemical analysis, sensory analysis), *Clostridium botulinum*, comparison of methodologies (cod, rockfish and rock cod, salmon, finfish, swordfish, shrimp, herring and cooked seafood) adjunct treatments (potassium sorbate, irradiation, other treatments), ramification of MAP (residual effects, undesirable effects like odour and colour, texture, drip), packaging in modified atm. (bulk containers, master packs, individual MAP packages), and quality control. 14 references. SRA

648

Raghunath (MR) and McCurdy (AR). **Synthesis of plasteins from fish silage.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 655-658

Fish silage, a hydrolysate from fish waste obtained by autolysis was investigated as a raw material for plastein synthesis. Optimum plastein synthesis from fish silage occurred between 65 and 70% degree of hydrolysis. Pepsin, papain and chymotrypsin synthesised plasteins from fish silage optimally at pH of 5.0, 6.7 and 8.0 resp. Plastein yield was highest when trichloroacetic acid was used as the precipitant. GS

649

Oehlenschläger (J). **Chemical composition of the flesh and other tissues of Antarctic fish species of the families Channichthyidae and Nototheniidae.** *Food Chemistry* 40(2): 1991: 159-167

The muscle, intestinal tract, stomach, spleen, heart, pyloric caeca, gonads and liver of 4 Antarctic fish species, *Notothenia neglecta*, *Notothenia gibberifrons*, *Chaenocephalus aceratus* and *Champscephalus gunnari* were analysed for moisture, crude protein, carbohydrate, fat, ash, chloride and phosphorus. The chemical composition of the flesh of the fish showed that all 4 species are valuable food fishes with a high protein (17 - 19%) and a low to moderate fat content (0.8 - 1.9%). In all fishes investigated high amounts of trimethylamine oxide-nitrogen were present. Levels of trimethylamine-nitrogen were substantially higher (5 mg/100 g) and that of dimethylamine-nitrogen lower (0.05 mg/100 g) than in North Atlantic fish, while the ammonia-nitrogen content was comparable (10 mg/100 g). During distillation only nototheniids underwent deamination reactions leading to high TVB-N values. Ice-fishes were unaffected. *N. neglecta* and *N. gibberifrons* were found to store considerable amounts of carbohydrates and fat in their livers (4.6 and 8.2% carbohydrates and 16.3 and 14.4% fat, resp.). *Ch. gunnari* accumulates fat in intestinal tract, spleen and pyloric caeca. The stomachs of all fishes had high chloride levels. The livers of *Chaenocephalus aceratus* were heavily infested (up to 20 wt.%) by the parasitic nematode *Contracaecum* spec. AS

650

Kotb (AR), Abu Hadeed (AF) and Al-Baker (AA). **ω -3 polyunsaturated fatty acid content of some popular species of Arabian gulf fish.** *Food Chemistry* 40(2): 1991: 185-190

651

Simko (P). **Changes of benzo(a)pyrene contents in smoked fish during storage.** *Food Chemistry* 40(3): 1991: 293-300

Benzo(a)pyrene (BaP) was detn. by HPLC method, Separon SGX C-18 column, using selective fluorescence detection. BaP degradation in the model system was directly proportional to the duration of influence of environmental, physicochemical factors but in smoked fish the contents were changed according to the diffusion into the internal product layers showing that BaP cannot be constant but gradually decreases due to various factors influencing the degradation process. SD

652

Steiner-Asiedu (M), Julshamn (K) and Lie (O). **Effect of local processing methods (cooking, frying and smoking) on three fish species from Ghana. Part I. Proximate composition, fatty acids, minerals, trace elements and vitamins.** *Food Chemistry* 40(3): 1991: 309-321

Processing per se had no effect on the comp. of two marine (*Sardinella* sp., *Dentex* sp.) and a fresh water fish (*Tilapia* sp.). Smoking and cooking did not affect free fatty acid comp. of which was masked by palm-kernel oil in fried fish. The fish contained appreciable amounts of n-6 fatty acids, Na, Ca, P, Mg and trace elements (Fe, Cu, Zn and As). There were no thiamine (low in *Dentex* sp. only) due to thiaminase and low vitamins B₂ and B₆ in all the fish. SD

Pink perch

653

Vidyasagar Reddy (G), Srikar (LN), Kuntia (BK) and Senthilvel (A). **Lipid freshness parameters in relation to shelf-life of pink perch (*Nemipterus japonicus*) stored in ice.** *Indian Journal of Nutrition and Dietetics* 27(2): 1990: 53-58

This investigation was conducted to study the effect of storage in ice on the development of hydrolysed and oxidative products which affect the texture and flavour of fish due to their interaction with proteins. Pink perch was iced in an insulated fish container, and was held for 0 (fresh), 3, 5, 8, 11 and 14 days and the changes in chemical and organoleptic qualities were determined. During 14 days the lipid content decreased from 0.74 to 0.63% and salt soluble proteins also decreased significantly, but the peroxide value increased from 12.29 to 26.39 mm of O₂ per 1000 g lipid. The increase in thiobarbituric

acid number during storage was from 0.41 to 0.64, but the free fatty acid (as oleic acid) increased from 3.73 to 13.31% of total lipids. Pink perch was rated acceptable upto 13 days in ice. GS

Salmon

654

Polvi (SM), Ackman (RG), Lall (SP) and Saunders (RL). **Stability of lipids and omega-3 fatty acids during frozen storage of Atlantic salmon.** *Journal of Food Processing Preservation* 15(3): 1991: 167-181

Very little loss of triglyceride and no selective change in triglyceride fatty acid comp. but an increase in lysophospholipids and in free fatty acids were noticed in salmon fillets stored at -12 C for 3 months. Certain degree of non random lipolysis of phospholipid occurred with selective enrichment of free fatty acids in omega-3 fatty acids. Formation of polar (oxidized) accompanied hydrolysis of the omega-3 fatty acids most of which remained nutritionally available after storage. SD

Sardines

655

Choorit (W), Sophanodora (P), Wuttijumnong (P), Poidam (A) and Buckle (KA). **Quality of fish paste (kapi) from sardine.** *ASEAN Food Journal* 6(1): 1991: 28-31

The effect of delay in salting time (0, 1, 2 days), fish-salt ratio (2:1, 3:1, 4:1 W) and repetition of pasting (mincing) step (1, 2 times) on quality of fish paste (kapi) from sardine were studied using a 3³ factorial design. Samples were taken at 0, 10, 30 and 60 days for total volatile bases analysis of amino nitrogen and pH. Results indicated that delay in salting time and fish:salt ratio affected the quality of fish paste. The most acceptable product was prepared with a fish:salt ratio of 4:1 (w/w) with a delay in salting time of one day. The product contained 20% (dry basis) protein, 23% (dry basis) salt, 45% moisture, total volatile bases of 5.4 g/kg (dry basis), amino nitrogen content 23.2 g/kg (dry basis) and pH 7.0. SRA

Tuna

656

Przybylski (R), Eskin (NAM) and Malcolmson (LJ). **Development of a gas chromatographic system for trapping and analyzing volatiles from canned tuna.** *Canadian Institute of Food Science and Technology Journal* 24(3/4): 1991: 129-135

Two models based on chemical groups of components were developed to predict decomposition and rancid off-odour. Recovery of over 80% of the volatile components from canned tuna was obtained with a coeff. of variation of 3.2%. The use of sodium sulphate as dehydrating agent resulted in poorer reproductivity and higher coeff. of variation of 6.9%. GS

Products

657

Yu (SY). **Effect of fish:flour ratio on fish crackers 'Keropok'.** *ASEAN Food Journal* 6(1): 1991: 36

This analytical study revealed that protein contents were increased with increasing fish content but the protein, moisture, fat and ash contents were largely unaffected. With the ratio of 2:1 of fish to flour (30.1% protein) there was a marked decrease in linear expansion which was directly related to the crispness, which was found to be the most important parameter governing the quality of 'Keropok'. At a protein content of 30%, the linear expansion of 103.4% was well within acceptable limits. However, samples with higher protein contents at a ratio of fish to flour greater than 2:1 were not acceptable. SRA

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

658

Sen (AK) and Bhattacharjya (S). **Quality norms for alcoholic drinks.** *ISI Bulletin* 4(10): 1991: 414-417

The Bureau of Indian Standards, New Delhi has formulated standards for alcoholic drinks considering such aspects as raw materials, alcoholic content, additives, sensory evaluation and packing. The authors feel that these standards need revision if these products are to compete with internationally reputed brands. SRA

Coffee

659

Berger (A), Brulhart (M) and Prodoliet (J). **Detection of adulteration in pure soluble coffee by enzymatic sugar determination.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 59-62

Detection of adulteration in instant coffee with various carbohydrate-containing coffee substitutes can be easily achieved by an enzymatic detn. of fructose and glucose after controlled acid hydrolysis of the suspected sample. The procedure was applied to pure soluble coffees of different origins. Values of 0.8% for total fructose and 1.8% for total glucose have been derived as reasonable limits above which an instant coffee should be considered as adulterated. Analysis of deliberately adulterated instant coffees enabled lowest detectable levels to be determined for various ingredients. These levels lie around 1.5% for chicory, 2.5% for cereal products and 3.5% for caramel. The procedure can also be applied to the detection of low levels of other coffee substitutes such as figs, maltodextrins, glucose syrups, starch and unroasted coffee husks/parchment. The method is however not intended for identifying the type or determining the amount of adulterants. AS

660

Maier (HG). **Carcinogenic compound content in coffee beans.** *Cafe-Cocoa-The* 35(2): 1991: 133-142 (Fr)

A review of the publication of the last 25 yrs about the detn. of polycyclic aromatic hydrocarbons, nitrosamines and carcinogenic mycotoxins in coffee. 32 references. BV

Fruit juices

Apple juices

661

Principe (L) and Lozano (JE). **Reduction and control of non-enzymatic browning in clarified apple juice by absorption and ion exchange.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 34-38

This paper discusses the applications of activated carbon (AC) and ion exchangers for decolouration and control of non-enzymatic browning in clarified apple juice. Different ACs were assayed as brown-component absorbers. They were effective

for the decolouration of long-term stored apple juices with low amino acid content. The degree to which decolouration occurred and the resulting equilibrium relationship have been correlated according to the empirical isotherm of Freundlich. Apple juices were also treated with Amberlite IRA-958 and Dowex (50 x 8) resins which gave a product with acceptable physical, chemical and sensory characteristics. The partial reduction of amino compounds resulted in a proportional decrease of the non-enzymatic browning rate. Results also show that ion exchange-treated juices were more stable under hard storage conditions. AS

662

Jenniskens (LHD), Voragen (AGJ), Pilnik (W) and Posthumus (MA). **Effects of the treatment of apple pulp with liquefying enzymes on the aroma of apple juice.** *Lebensmittel-Wissenschaft und -Technologie* 24(1): 1991: 86-92

The effects of apple pulp treatments with liquefying enzymes on the aroma comp. of apple juice was studied with capillary GC. Conventionally produced apple juice was compared with apple juices produced by enzyme treatment, and with control juices, i.e. juices produced by pressing after pulp incubation without liquefying enzymes. It was found that the effects could be divided in an incubation effect, which was caused by prolonged action of the endogenous enzymes, and in a specific liquefaction effect which caused an extra release of aroma components or precursors of aroma components from the pulp particles into the juice. Furthermore the presence of esterase and C6-aldehyde forming side activities in the liquefying enzyme preparation was demonstrated. AS

Grape juices

663

Vasundhara (TS), Phanindra Kumar (HS) and Jayathilakan (K). **Effect of relative concentration of different sugars on the freeze-drying properties of grape juice.** *Journal of Food Science and Technology (India)* 29(1): 1992: 45-47

The juice from blue grapes varied considerably in its total sugar content during a 2 yr period from 8 to 19° Brix in which the reducing sugar amounted to 85 - 90%. When made up as 20° Brix juice, these samples exhibited various problems during freeze-dehydration. When the sucrose to glucose ratio was equal or lower than 1.0:0.47 or sucrose to fructose ratio was equal or lower than 1.0:0.27; the juice could be satisfactorily freeze-dried and stored without exhibiting hygroscopicity for several months. With higher initial Brix, of greater than 8° these values were much higher and led to drying

problems. Method adopted for preparing juice for freeze-drying when the ratio were altered to increase the total non-reducing portion by incorporating cane sugar to a level of 30, 35 and 40° Brix, the same juice samples dried satisfactorily. The ratio of the total reducing sugar to sucrose rather than the ratio of glucose or fructose to sucrose individually was found to be more important in determining the freeze-dried characteristics of grape juice. AS

664

Malletroit (V), Guinard (J), Kunkee (RE) and Lewis (MJ). **Effect of pasteurization on microbiological and sensory quality of white grape juice and wine.** *Journal of Food Processing Preservation* 15(1): 1991: 19-29

Heat treatment, of less than 3 Pasteurization Units (PUs) reduced 10^6 cells/mL of *Saccharomyces cerevisiae* and *Hansenula anomala* added to chenin blanc juice to an undetectable level. 10^5 PUs resulted measurable browning in juice and upto 50,000 PUs did not significantly affect flavour as determined by a trained panel. Pasteurized (23 PUs) and nonpasteurized juice fermented at the same rate. Tunnel pasteurization (13.7 PUs) reduced 5×10^6 yeast cells/mL added to grape juice to an undetectable level without affecting juice or wine flavour. SD

Orange juices

665

Watanabe (H), Hagura (Y), Ishikawa (M), Mihori (T) and Sakai (Y). **Elastic modulus of orange juice ice.** *Journal of Food Process Engineering* 14(1): 1991: 1-8

The elastic modulus of orange juice ice as well as pure water ice was measured at temp. between -10 and -196 C by compression tests. The elastic modulus of pure water ice was almost constant in the whole range of the tested temp.: 5.6×10^9 N/m² at -196 C and 4.0×10^9 N/m² at -10 C. In contrast, the elastic modulus of orange juice ice changed greatly with temp.: 11×10^9 N/m² at -196 C and 0.2×10^9 N/m² at -10 C. Orange juice ice was considered to consist of pure water ice particles which are dispersed in a matrix of concentrated amorphous solution (CAS). The elastic modulus of CAS was calculated using an equation for a disperse system. AS

Pineapple juice powder

666

Phanindra Kumar (HS), Jayathilakan (K) and Vasundhara (TS). **Factors affecting the quality of freeze-dried pineapple juice powder.** *Indian Food Packer* 45(2): 1991: 5-11

Pilot scale production of freeze-dried juice powder was tried with 'Gaint Kew', 'Queen' and Mixed (Mauritius) var. of pineapple. 'Gaint Kew' var. with a min. Brix of 12°, acidity around 1.0% and with a min. of 120 µg total carotenoids/100 g juice gain an acceptable quality product. Other var. were unsuitable for freeze-dried juice powder preparation. Addition of citric acid prior to pasteurization was detrimental to the quality of the freeze-dried powder. Pulverisation of juice powder with sugar increased the *a_w* of the product and protected against minor changes in moisture and temp. which were important in the quality and stability of the product. VKR

Tangerine juices

667

Chamchong (M) and Noomhorm (A). **Effect of pH and enzymatic treatment on microfiltration and ultrafiltration of tangerine juice.** *Journal of Food Process Engineering* 14(1): 1991: 21-34

Tangerine (*Citrus reticulata* blanco) juice clarification by crossflow microfiltration and ultrafiltration using polysulphone flat sheet membranes with nominal mol. wt. cut off of 25,000, 50,000, 100,000 and 0.1 µm, 0.2 µm pore sizes was studied. The juice was pretreated by polygalacturanase and pH adjustment. The treated juice was clarified with a lab. scale filtration unit with effective filtration area of 14 cm². Filtration conditions were transmembrane pressure of 93 to 194 kPa, crossflow velocity of 0.96 to 3.5 m/s and 25 C. Membrane performance was evaluated in terms of volume flux and clarity (% transmittance) of the permeate. Pretreatment of the juice by polygalacturanase and adjustment to pH 2 with HCl resulted in a clearer supernatant than enzyme treatment alone. Max. flux was obtained with the 0.1 µm microfiltration membrane. Flux increased with transmembrane pressure and crossflow velocity. Flux at 194 kPa and 3.5 m/s was 69 L per square meter per h. Permeate clarity was better at higher transmembrane pressure and lower velocity, due to the effect of the polarized/fouling layer of solute on the membrane surface, which acted as a secondary "dynamic" filter. AS

Oils

Palm oils

668

Jideani (VAE). **Carotene retention in palm oil by mechanised and traditional processes.** *Journal of Food Science and Technology (India)* 29(1): 1992: 68-69

Samples collected at various stages during mechanised and traditional palm oil production processes were cold saponified. The rate of β -carotene destruction was more in mechanical process. Hence, palm oil by traditional process retained about three times more carotene than that processed mechanically. The thermal destruction rate of carotene doubled for every 20 C rise in processing temp. AS

669

Manorama (R) and Rukmini (C). **Sensory evaluation of foods prepared in crude palm oil.** *Journal of Food Science and Technology (India)* 29(1): 1992: 70-72

Crude palm oil (CPO) produced in India has been evaluated for its nutritional quality and safe edibility. As it is one of the richest natural sources of β -carotene, it is an ideal vehicle for vitamin A supplementation programmes to pre-school and school children. Hence, foods prepared in CPO were evaluated for quality by a selected panel of judges. Mean scores by 15 judges for different quality attributes indicated that CPO was found suitable in the preparations of *sujl halwa* and *muruku*. Although it is known that continuous deep-fat frying for long periods results in destruction of β -carotene due to oxidative degradation, the first fried product *muruku* was found to have high β -carotene retention, and in this product, CPO was also found to be highly suitable by the panel. Preparations made in a 1:1 blend of refined groundnut oil and CPO also showed good quality. AS

Rice bran oils

670

Sivala (K), Vasudeva Rao (V), Sarangi (S), Mukherjee (RK) and Bhole (NG). **Mathematical modelling of rice bran oil expression.** *Journal of Food Process Engineering* 14(1): 1991: 51-68

The expression of liquid from a solid-liquid matrix oil-bearing material is a complex process and is incompletely understood. An investigation was taken up to understand the phenomena relating to compression and consolidation of rice bran and gain an insight into flow behaviour of oil under uniaxial compression. A mathematical model based on one-dimensional consolidation theory (Terzaghi, 1943) was developed with suitable assumptions, taking into account the test-cell geometry. The experiments were conducted with two types of parboiled rice bran: original unsieved bran and bran sieved through B.S. 30 mesh. The developed model was tested and a close agreement was found between calculated and observed values. AS

SPICES AND CONDIMENTS

Spices

Garlic

671

Mirhadi (SA) and Sundarshan Singh. **Effect of garlic supplementation to cholesterol-rich diet on development of atherosclerosis in rabbits.** *Indian Journal of Experimental Biology* 29(2): 1991: 162-168

Male albino rabbits (25) of about 2 months age were fed for 150 days with garlic at 1 g/kg body wt. along with a basal diet consisting of green lucerne, water soaked green gram and cholesterol. Inclusion of garlic in cholesterol-rich diet retarded the development of atherosclerosis by (i) decreased uptake of cholesterol by aorta through decreased concn. of plasma cholesterol, (ii) increased mobilisation of cholesterol and other lipids and their decreased biosynthesis in the aorta, (iii) increased excretion of bile acids through faeces and (iv) increased plasma fibrinolytic activity. Inclusion of garlic in the atherogenic diet also decreased the total lipids and cholesterol accumulation in the liver. SRA

SENSORY EVALUATION

672

Vickers (Z). **Sound perception and food quality.** *Journal of Food Quality* 14(1): 1991: 87-96

Auditory attributes such as crispness and crunchiness contribute to food quality adding complexity and interest to consumer. Factors like briskness in carbonated beverage are desirable and grittiness with sound is food undesirable. SD

673
 Civile (GV). **Food quality: Consumer acceptance and sensory attributes.** *Journal of Food Quality* 14(1): 1991: 1-8

The measurement of food quality includes the detn. of key attributes and measurement of conformance to them. Both descriptive analysis documenting products and consumer input measuring effective responses define sensory quality. Since descriptive quality specification and consumer response to key attributes are related and the management can use the same for quality control. SD

674
 O'Mahony (M). **Taste perception, food quality and consumer acceptance.** *Journal of Food Quality* 14(1): 1991: 9-31

Aspects covered include: quality and consumer acceptance, taste and other senses, elimination of cross-sensory interference for sensory testing, basic tastes, primary tastes and descriptive analysis and the brain and information overload. SD

675
 Lawless (H). **The sense of smell in food quality and sensory evaluation.** *Journal of Food Quality* 14(1): 1991: 33-60

Covers definition of quality, the role of olfaction in sensory quality (retronasal smell and flavour, quality and product defects, modeling acceptance) and concerns in the evaluation of aroma and flavour (instrumental-sensory relations, individual differences in odour responsiveness, context effects, the challenge of terminology development and quality in sensory testing). SD

676
 Clydesdale (FM). **Colour perception and food quality.** *Journal of Food Quality* 14(1): 1991: 61-74

This paper briefly reviews some of the relationships between colour, acceptability and food intake which are obviously critical to food quality. It also discusses a generalized model of colour measurement, and describes a few specific examples of how this model might be utilized as a potential predictor of quality parameters. 27 references. SD

677
 Szczesniak (AS). **Textural perceptions and food quality.** *Journal of Food Quality* 14(1): 1991: 75-85

Assessment in scoring systems, texture as a general concept (definition, and classification of textural characteristics) importance to consumer, connotation of specific textural characteristics, and texture perception are the aspects reviewed in this article. 29 references. SD

678
 Teranishi (R), Buttery (RG), Stern (DJ) and Takeoka (G). **Use of odour thresholds in aroma research.** *Lebensmittel-Wissenschaft und - Technologie* 24(1): 1991: 1-5

The concept of odour threshold is useful in : 1. defining odour purity, 2. estimating the necessary amount of starting material, 3. serving as a reference point in describing intensity and odour quality, and 4. evaluating which of the components present are important in contributing to a characteristic aroma. A graphic representation of the concn. of components present and contribution of each constituent can now be presented as an 'aromagram'. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

679
 Vijaya Bhanu (N), Geeta Ramachandra and Vincent Monteiro (P). **Evaluation of protein isolate from *Cassia uniflora* as a source of plant protein.** *Journal of the Science of Food and Agriculture* 54(4): 1991: 659-662

Cassia uniflora Mill (*Cassia sericea* Sw) was analysed for its proximate composition and amino acid profile of a protein isolate prepared from it. The isolate contained 725 g Kg⁻¹ protein, was rich in lysine and less sulphur and aromatic amino acids and leucine. Antinutritional factors like phytates and phyto haemagglutin (PHA) were not to be found. Polyphenols were moderately high whereas trypsin and chymotrypsin were very high. However the protein isolate had a high (93.6%) *in vitro* protein digestibility. GS

680
 Barthakur (NN) and Arnold (NP). **Nutritive value of the chebulic myrobalan (*Terminalia chebula* Retz.) and its potential as a food source.** *Food Chemistry* 40(2): 1991: 213-219

Chebolic myrobalan edible fruit tissue contained 10.3 and 14.5 times more vitamin C than commercial apples and the fruit could be a source of dietary supplement in vitamin C, energy, protein and mineral nutrients. The min. recommended dietary allowance for Se, K, Mn, Fe and Cu can be met (100, 63.5, 32, 30 and 28.5% resp.) if 100 g of the raw fruit is eaten. Aspartic acid, glutamic acid, arginine, proline and lysine constituted 39.6, 8.6, 6.7, 6.4 and 5.0% resp. of the total amino acids. SD

BIOCHEMISTRY AND NUTRITION

681

Daily (S), Armfield (SJ), Haggett (BGD) and Downs (MEA). **Automated enzyme packed-bed system for the determination of vitamin C in foodstuffs.** *Analyst (London)* 116(6); 1991; 569-572

A microprocessor controlled flow injection system is described for the detn. of vitamin C in foodstuffs. The system is based on amperometric detection at a wall-jet electrode coupled with an ascorbate oxidase packed bed. A commercially available Cartesian

robotic auto-sampler-dilutor is used as a means of fully automating the sample handling and dilution. Dithiothreitol (DTT) is used to reduce dehydroascorbic acid to ascorbic acid and to stabilize ascorbic acid standard solutions. Initially, the system was connected in series with a HPLC column and UV detector to allow identification of possible interferents and to allow comparative evaluation of results. The system showed a linear response to the concn. of L-ascorbic acid in the range 1-200 $\mu\text{g ml}^{-1}$ and was capable of detecting total vitamin C in a range of foodstuffs at a sample throughput of 15 samples h^{-1} . Correlations to existing methods of 0.98 were obtained. AS

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

Nil

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GENERAL

682

Rhodes (ME). **Educating professionals and consumers about extended-shelf-life refrigerated foods.** *Food Technology* 45(4): 1991: 162, 164

Education and training programs to professionals and consumers on food safety and proper handling of extended-shelf-life refrigerated foods are dealt in this article. CSA

683

Wrolstad (RE). **Ethical issues concerning food adulteration.** *Food Technology* 45(5): 1991: 108, 112, 114, 117

This article discusses two juice adulteration cases: adulterated cranberry juice cocktail and beech-nut adulterated apple juice and presents thought-provoking questions and recommendations as to what actions should be taken by individuals in such situations. CSA

684

Bhag Mal and Sudhir Kochhar. **Under-utilized trees for food: Promise and potentials.** *Indian Farming* 41(8): 1991: 36-41

The authors cover exhaustively the bamboo species suitable for cultivation for food and table purposes giving details of parts used in different food preparation. They have given a detailed list of trees/species used for vegetable and table purpose, of some of the exotic tree species of food value: chemical composition and general characteristics/fatty acid composition for some of the under-utilized indigenous trees. SD

685

Dattatreya (M). **India's food exports to global markets. Exportable surpluses - key to expanding exports.** *Indian Food Industry* 10(2): 1991: 16-20

This article discusses the problems and challenges in India's food export and the export prospects of various commodities like wheat, basmati rice, tea, coffee, tobacco, spices, cashew, cotton, fresh and processed fruits and vegetables, marine products, meat products, oilcakes, sugar and poultry. CSA

686

Bhat (RV). **Pattern of detention of foods of Indian origin at ports of entry in USA.** *Indian Food Industry* 10(2): 1991: 21-22

This article attempts to make a study on the pattern of detention of foods of Indian origin at the ports of entry in the USA. It was found in 1989 that among the 2465 consignments found to be not conforming to the Food and Drug Administration specifications from different countries, 186 consignments were of Indian origin. The cause of detention were the presence of pathogenic bacteria and animal filth in commodities like rice, sesame seed and shrimps. Remedial measures to prevent contamination are discussed. CSA

687

Parpia (HAB). **Human resource development in food science and technology. A socio-technological approach.** *Indian Food Industry* 10(3): 1991: 24-28, 33

This article discusses about the effective use of agro-food system as a means of socio-economic development which requires well-trained and culturally-oriented human resource in food science and technology. The socio-technological challenges faced and the socio-technological education and training needs of developing countries are discussed. CSA

688

Sakariah (KK). **Food industry - manpower needs and training.** *Indian Food Industry* 10(3): 1991: 29-31

The increasing trend in production and demand both in internal and in export markets for certain traditional foods and tropical fruit products makes it necessary to have more manpower in the area of food science and technology. The present status in food technology training, the understanding and mutual co-operation that has to exist between the institutes/universities and the industry and the need for manpower in processed food industries is projected in this article. CSA

689

Kishor Kher. **Non-technical manpower requirements of the food processing industry.** *Indian Food Industry* 10(3): 1991: 32-33

This article covers the requirement, recruitment, team building and the future of commercial or non-technical manpower of the food processing industry. CSA

690

Chang (KLB) and Halek (GW). **Analysis of shear and thermal history during co-rotating twin-screw extrusion.** *Journal of Food Science* 56(2): 1991: 518-531

A computation procedure was developed for calculating contributions of frictional and viscous heat generation during co-rotating twin-screw extrusion. Application of energy balance to experimental data (mechanical energy input, feed rate, feed moisture, screw speed, die pressure, barrel wall and dough temp. profiles) indicated how conditions affected fill, filled length, shear and thermal energy inputs to the foods. Kneading blocks increased degree of fill in partially filled sections, and dissipated 4 - 6 times more viscous heat than conveying elements in completely filled sections. Energy input profiles along extruder screw axis clearly demonstrated how heat generation from shear and heat transfer between extruder and foods influenced total energy input. AS

FOOD ENGINEERING AND EQUIPMENT

691

Potty (VH). **Food irradiation and cost consideration.** *Indian Miller* 21(3): 1990: 3-6

A brief general type of article wherein the irradiation of food has been compared with other preservation methods like chemical disinfestation, refrigeration and dehydration. Fumigation of spices and modified atm. storage of fruits were also compared with irradiation. SRA

692

Sheen (S) and Hayakawa (K-I). **Parametric analysis for the freezing of spheroidal or finitely cylindrical objects with volumetric changes.** *Journal of Food Science* 56(2): 1991: 543-549

This study was made to develop regression equations for predicting freezing time or spheroidal (prolates or oblates) and finitely cylindrical foods which account for volumetric changes, and to examine the influence of volumetric expansion on estimates of freezing time. Analysis showed that the convective surface heat transfer coeff. was the most significant factor affecting accuracy of calculated freezing time followed by operational temp., thermophysical properties and food dimensions. Effect of volumetric expansion on freezing time estimation was not significant. SRA

693

Ramaswamy (H), Van de Voort (FR), Raghavan (GSV), Lightfoot (D) and Timbers (G). **Feed-back temperature control system for microwave ovens using a shielded thermocouple.** *Journal of Food Science* 56(2): 1991: 550-552, 555

Results indicate a thermocouple-based temp. feed-back system could successfully be employed to control a microwave magnetron and maintain a constant sample temp. for aqueous samples over a wide range of vol. The power to vol. ratio had to be adjusted or maintained so that the heating rate did not exceed the thermocouple response time in the case of smaller volumes. Such a system could find applications where microwave heating effects are to be studied, such as enzyme inactivation or for control of microwave processes like blanching, drying or pasteurization. SRA

Equipments

694

Rangaswamy (K), Karunanithi (R), Manohar Jesudas (D) and Swaminathan (KR). **Low-cost tray for papain collection.** *Invention Intelligence* 25(9): 1990: 419-420

A low-cost papain collection tray suitable for quick fixing on to the trunks of any papaya plant has been developed, which are light in wt. (500 g), can be easily fabricated, and costs only Rs. 20/unit. SRA

695

He (H) and Hosney (RC). **A critical look at the electric resistance oven.** *Cereal Chemistry* 68(2): 1991: 151-155

An electric resistance oven (ERO) was used to study the properties and electric resistance of dough at increasing temp. In this study, a modified ERO was used to improve the flow of CO₂ released from the dough to the detector. The results showed that heating methods not only determined the profile of dough temp. but also affected the expansion, CO₂ release patterns, and electrical resistance of dough. The resistance of dough containing yeast was three times higher than that of dough without yeast. To obtain a fully baked loaf, input power needed to be sufficient to raise the dough temp. to 100 C and to compensate for the heat loss to the atm. Baking with the ERO at room temp. resulted in temp. gradients from the center to the outer layer of the dough, with the greatest gradient near the top of the dough. This probably was caused by dissipation of heat to the environment and by the lack of electrical heating in the crown area of the dough. AS

ENERGY IN FOOD PROCESSING

696

Jain (SK). **Appropriate solar applications for rural areas.** *Invention Intelligence* 26(3); 1991: 126-131

Some of the aspects on simple technologies for utilisation of solar energy to meet rural energy needs, particularly for water heating, cooking, drying of vegetables and fruits, and conversion of brackish water into potable water are discussed. All these solar appliances are competitive with existing appliances using conventional energy sources, and can be adopted right away. SRA

FOOD CHEMISTRY AND ANALYSIS

Chemistry

697

Ikegami (T), Nagashima (K), Shimoda (M), Tanaka (Y) and Osajima (Y). **Sorption of volatile compounds in aqueous solution by ethylene-vinyl alcohol copolymer films.** *Journal of Food Science* 56(2); 1991: 500-503, 509

The use of ethylene-vinyl alcohol copolymer (EVOH) films as sealant in soft packages from the viewpoint of effects of ethylene content, biaxial drawing and film thickness on sorption of volatile compounds has been evaluated in this study. With regard to EVOH, equilibrium swelling values gave rise to a bimodel solubility parameter distribution with maxima at δ values of 8.5 assigned to ethylene units and 14.5 to vinyl alcohol units. Comparing distribution ratios of EVOH with those of middle-density polyethylene (MDPE), the ratios were 1:100 for terpene hydrocarbons, 1:10 for esters, 1:2 for alcohols, and 1:1 for aldehydes. By biaxial orientation of EVOH film, the sorption could be depressed below 60%. Results suggest that EVOH film are more appropriate than MDPE for food container lining. SRA

Chemistry(Analytical)

698

Fay (JM). ***Icacina oliviformis* (Icacinaceae): a close look at an underexploited food plant. II. Analyses of food products.** *Economic Botany* 45(1); 1991: 16-26

The proximate analysis of the seeds and tuberous roots of *Icacina oliviformis* from Central African

Republic indicated that the seeds contain: 80.7% Nitrogen-free extract (NFE), 14.0% crude protein, and 0.5% crude fat (dry wt.). The av. moisture content of live seeds is 18.3%. The roots contain 84.5% NFE, 4.4% crude protein, and 1.6% crude fat (dry wt.). The moisture content of fresh root is ca. 59%. The amino acid profile of the seed protein is comparable to that of a protein of moderately high quality. The nutritional value of the food products derived from *I. oliviformis* compares favourably with that of the most commonly cultivated crops in the area where this sp. is exploited. GS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

699

Weng (Z), Hendrickx (M) and Tobback (P). **Immobilized peroxidase: A potential bioindicator for evaluation of thermal processes.** *Journal of Food Science* 56(2); 1991: 567-570

A novel bioindicator has been proposed for evaluating thermal processes under conditions of pasteurization (60 - 85 C). The heat-stable fraction of the covalently immobilized peroxidase in/on glass beads in the environment of dodecane was used for this purpose with a Z value of 10.1 C and a Dref value of 22 min at 70 C. The lethality (f_{10}) values read from the bioindicator coincided with the target $Ft^{10.0}$ -values integrated from the time-temp. curves according to the general method. The proposed bioindicator could be scaled down accordingly, encapsulated in a small vial, located in the centre of a food unit and used to evaluate lethality at that point during thermal processing. A single-point lethality could be obtained when the encapsulated bioindicator was very small compared to the food unit. SRA

700

Weng (Z), Hendrickx (M), Maesmans (G), Gebruers (K) and Tobback (P). **Thermostability of soluble and immobilized horseradish peroxidase.** *Journal of Food Science* 56(2); 1991: 574-578

In this study, the thermal characteristics (Z-value, decimal reduction time and activation energy) of both soluble and modified peroxidase in aqueous and non-aqueous solvents has been investigated. Two fraction model is used to describe thermal inactivation kinetics in all these cases. By immobilizing the enzyme both the Z value and D value changed substantially. In non-aqueous solvents, the hydrophobicity (log P) of the organic solvent had a profound effect on D value of the enzyme, but had less effect on the Z-value. A Z value

of 11.1 C was obtained for immobilized peroxidase in dodecane, which may be used for further investigation as a bioindicator (biological time-temp.-integrator) for evaluating pasteurization process. If the Z value of a heat stable enzyme was near 10 C in a given temp. range, it has potential use as a bioindicator for thermal processing. SRA

Microorganisms

Bacteria

701

Wenzel (JM) and Marth (EH). **Behaviour of *Escherichia coli* 0157:H7 or *Yersinia enterocolitica* in the presence of *Streptococcus cremoris* in a medium with internal pH control.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991; 164-168

Behaviour of *Escherichia coli* 0157:H7 or *Yersinia enterocolitica* in a medium with internal pH control (IPCM-1) and containing *Streptococcus cremoris* (*Lactococcus lactis* subsp. *cremoris*) was determined. Samples of IPCM-1 were inoculated to contain, per milliliter, ca., 10^3 CFU *E. coli* 0157:H7 or *Y. enterocolitica* and *S. cremoris* (ca., 2.9×10^5) and incubated at 25 or 30 C for 18 h. Populations of *E. coli* in controls were 10^8 and 10^9 CFU/ml after 18 h of incubation at 25 and 30 C, resp. *Y. enterocolitica* controls contained ca., 10^8 CFU/ml after 18 h regardless of incubation temp. IPCM-1 is ready for use when a pH of 5.5 is reached after 16 - 18 h or incubation. This pH was reached in almost all trials after 18 h of incubation. *Escherichia coli* was affected less by presence of *S. cremoris* than was *Y. enterocolitica*. After 18 h incubation at 25 and 30 C, populations of *E. coli* had increased to 10^7 and 10^8 CFU/ml, resp., in samples of IPCM-1 containing the pathogen and the lactic culture. Although *Y. enterocolitica* was more sensitive than *E. coli* to the effects of *S. cremoris*, 10^5 - 10^6 of the pathogen were present per milliliter of treatment samples after 18 h of incubation at either temp. Although some inhibition was caused by presence of *S. cremoris*, substantial numbers of *E. coli* 0157:H7 and *Y. enterocolitica* were present in IPCM-1 when it is said to be ready for use. AS

Clostridium botulinum

702

Doyle (MP). **Evaluating the potential risk from extended-shelf-life refrigerated foods by *Clostridium botulinum* inoculation studies.** *Food Technology* 45(4): 1991; 154-156

Types and number of *C. botulinum* strains required; methods for spore production, preparation and enumeration; number of spores inoculated; methods of inoculation; packaging of product; time and temp. of incubation; sample size, sampling times and number of samples; botulinal toxin testing procedure and types of product analyses are the various guidelines discussed in determining the potential for *C. botulinum* toxin production in refrigerated foods. CSA

Clostridium perfringens

703

Cudjoe (KS), Thorsen (LI), Sorensen (T), Reseland (J), Olsvik (I), Granum (PE). **Detection of *Clostridium perfringens* type A enterotoxin in faecal and food samples using immunomagnetic separation (IMS)-ELISA.** *International Journal of Food Microbiology* 12(4): 1991; 313-321

A simple, rapid sensitive immunoassay, based on immunomagnetic particles (Dynabeads M-280) was developed for detection and quantitation of *Clostridium perfringens* type A enterotoxin from faecal and food extracts. The assay had a detection limit of 2.5 ng/ml enterotoxin in homogenous of faeces and inoculated meat extracts. The specificity was confirmed by both cross immunoelectrophoresis and Western immunoblotting techniques; using a purified enterotoxin as standard. AS

Escherichia coli

704

Franco (BDGM), Gomes (TAT), Jakabi (M) and Marques (LRM). **Use of probes to detect virulence factor DNA sequences in *Escherichia coli* strains isolated from foods.** *International Journal of Food Microbiology* 12(4): 1991; 333-338

Escherichia coli strains were isolated from 96 food samples (32 milks, 4 dairy products, 36 raw meats, 7 meat products, 7 sandwiches and 10 ready-to-eat meals). A total of 306 colonies was submitted to hybridization assays with DNA probes for the following virulence factors: heat-labile toxins (LT-I and LT-II), heat-stable toxins (ST-h and ST-p), Shiga-like toxins (SLT-I and SLT-II), adherence factor of enteropathogenic *E. coli* (EAF) and invasive factor (INV). Six colonies isolated from 4 food samples hybridized with the probes for LT-II (3 colonies isolated from a milk sample), SLT-I and SLT-II (1 colony isolated from raw bovine meat) or EAF (2 colonies isolated from two raw chicken meat samples). AS

Listeria monocytogenes

705

Brown (WL). **Designing *Listeria monocytogenes* thermal inactivation studies for extended-shelf-life refrigerated foods.** *Food Technology* 45(4); 1991; 152-153

Guidelines for evaluating the safety of thermal processes for inactivation of *Listeria monocytogenes* in extended-shelf-life refrigerated foods are discussed. These factors include type and number of strains of *L. monocytogenes* to use as a inoculum; methods of production, enumeration and standardization of inoculum; size of inoculum; methods for inoculating different types of products; packaging of products; sample sizes and number of samples to test; heating of products; detn. of D and Z values in the lab.; enumeration methods and product comp. CSA

Staphylococcus aureus

706

Smith (JL) and Marmer (BS). **Death and injury in *Staphylococcus aureus* 196E. Effect of growth temperature.** *Lebensmittel-Wissenschaft und -Technologie* 24(2); 1991; 169-172

The incubation temp. at which *Staphylococcus aureus* 196E was grown affected its degree of thermal injury and death upon subsequent heat treatment. Using a heat treatment of 52 C for 1 h, lethality was low (one log or less) and injury was high (> 3 logs) for cells grown at 37 or 42 C under aerobic conditions. However, for *S. aureus* grown aerobically at 12 or 19 C, lethality was high (> 3 logs) but injury was reduced. Shifting cells grown at 12, 19 or 28 to 37 C for 5 h yielded cells that were less readily killed by the 52 C heat treatment. Growth at 28, 37 or 42 C under anaerobic conditions produced cells that were thermally resistant (approx. one log or less of killing). Cells grown anaerobically at 19 C were most resistant than aerobic cultures. Injury was greater with 19 and 28 C cells grown anaerobically than aerobically; the reverse was true with 37 and 42 C cells. The presence of nalidixic acid or rifamycin during the shift-up period (28 C grown cells shifted to 37 C for 5 h) inhibited the gain in thermotolerance but chloramphenicol was only slightly inhibitory. The data suggest that *S. aureus* growing in foods stored at lower temp. should be killed more readily by lower processing temp. Since temp. abuse of foods would lead to staphylococci with increased heat resistance, foods should be stored at refrigerated temp. until they are heat processed. AS

Fungi

Mushrooms

707

Paakkonen (K) and Plit (L). **Equilibrium moisture content and the state of water in processed Northern milk cap mushroom (*Lactarius trivialis*).** *Lebensmittel-Wissenschaft und -Technologie* 24(2); 1991; 121-124

The state of water in differently processed Northern Milk Cap mushrooms (*Lactarius trivialis*) was studied by differential scanning calorimetry (DSC). For DSC measurements the *Lactarius* powders were humidified over saturated salt solutions. The melting curve of the powders was compared with the water sorption isotherm. The non-freezable water obtained by calorimetry was in accordance with the water sorption isotherm. The blanched material dried with air at room temp. contained unexpectedly large amounts of freezable water at high *a_w* values. The blanched material dried with heated air originally contained more freezable water than the untreated material. AS

Hygiene

708

Wadstrom (T) and Ljungh (A). ***Aeromonas* and *Plesiomonas* as food - and waterborne pathogens.** *International Journal of Food Microbiology* 12(4); 1991; 303-311

Aeromonas and *Plesiomonas* have become increasingly recognized as human enteropathogens. *Plesiomonas shigelloides* has mainly been recovered from various seafoods, whereas *Aeromonas* sp. also multiply rapidly at +4 C which is a significant risk in food storage. *Aeromonas* sp. have furthermore been recovered from fresh water sources, and some isolates are resistant to chlorination which makes it a further risk factor. No large food- or waterborne outbreaks have been reported so far with *Aeromonas* sp. Various virulence factors involved in intestinal infections are described such as enterotoxins, cytotoxins and adhesins. AS

Safety

709

Flores (A). **Professional ethics and food safety.** *Food Technology* 45(5); 1991; 124, 126, 129

This article discusses the moral principles that warrant the responsibility of ensuring food safety. Aspects covered are human rights and food safety, food safety and professional ethics and problems with setting safety standards. CSA

Safety

710

Groth (EIII). **Communicating with consumers about food safety and risk issues.** *Food Technology* 45(5): 1991: 248, 250, 252-253

This article focusses on the food safety and risk issues that need to be communicated to the consumers. Aspects covered include public debates over food safety; experts' contributions in food safety debates; public perception of risks and various aspects to be communicated to the consumers. CSA

BIOTECHNOLOGY

711

Harlander (SK). **Biotechnology - a means for improving our food supply.** *Food Technology* 45(4): 1991: 84, 86, 91-92, 95

This article presents an overview of how biotechnology can impact the food chain. Various aspects related to biotechnology such as overcoming limitation of traditional methods; benefits to the agricultural sector; engineered organisms (*Bacillus thuringiensis*, *Rhizobium*) in agriculture and animal agriculture are dealt. Applications of biotechnology in food processing-related areas (fermented foods, processing aids, food ingredients, rapid detection systems and biosensors) and waste management; challenges to the food supply, promise of biotechnology and controversy over food are also discussed. 5 references. CSA

712

Busch (L). **Biotechnology. Consumer concerns about risks and values.** *Food Technology* 45(4): 1991: 96, 98, 100-101

Aspects such as the issue of risk and the issue of food values and how they shape consumer concern are discussed. Five requirements for a safe, secure and meaningful food supply that meets public standards such as minimal processing, authenticity, nutritional adequacy, availability and accessibility are also covered briefly. CSA

713

Welser (JR). **An industrial perspective on biotechnology issues.** *Food Technology* 45(4): 1991: 102, 104, 107, 109

This review article discusses the types of factors to be considered when making an investment in

biotechnology and the hurdles to be confronted during technology development. The article also covers some of the current applications in food technology and future developments of biotechnology and the challenges to continued growth. 1 reference. CSA

714

Ingenthron (GD). **Public communications. Genetically improved food crops.** *Food Technology* 45(4): 1991: 110, 112, 114, 117

Aspects related to public communications on genetically engineered food crops are covered. Discusses briefly various findings of related public opinion polls on food and gives some critics' positions on biotechnology. Concluding the article are recommendations for a broad approach for communicating on biotechnology-related issues. CSA

715

Harlander (SK). **Social, moral and ethical issues in food biotechnology.** *Food Technology* 45(5): 1991: 152, 154, 156, 158, 160-161

This article deals with some of the complex issues concerning the acceptance and adoption of biotechnology. Challenges facing agriculture, potential impact of biotechnology on agriculture and food systems, understanding public concerns and the role of the scientist in society are the various aspects covered. CSA

TISSUE CULTURE

716

Schenk (N), Hsiao (K-C) and Bornman (CH). **Avoidance of precipitation and carbohydrate breakdown in autoclaved plant tissue culture media.** *Plant Cell Reports* 10(3): 1991: 115-119

FeNa-EDTA, used in Murashige and Skoog media in the place of $\text{FeSO}_4 + \text{Na}_2\text{-EDTA}$, catalyzes the breakdown of fructose and glucose in the media. Autoclaving FeNa-EDTA separately from the carbohydrate constituents of the medium has the added advantage of preventing precipitation of certain micronutrient elements which improves quality of the medium without resorting to sterilization by filtering. To avoid further precipitation FeNa-EDTA and KH_2PO_4 autoclaved together. SD

717

Bhat (SR) and Chandel (KPS). **A novel technique to overcome browning in tissue culture.** *Plant Cell Reports* 10(6/7); 1991; 358-361

Use of *Dioscorea alata* L. revealed that an exudate from the cut end of the explants browned the culture medium which was lethal in small vol. Sealing the cut ends with paraffin wax controlled the browning by preventing exudation. The advantage of this simple technique over the others is discussed. SD

718

Sudhakar Johnson (T), Ravishankar (GA) and Venkatraman (LV). **Elicitation of capsaicin production in freely suspended cells and immobilized cell cultures of *Capsicum frutescens* Mill.** *Food Biotechnology* 5(2); 1991; 197-205

Capsaicin, an important food additive was produced *in vitro* by free cells and immobilized cells of *Capsicum frutescens* cultured in liquid medium. Elicitation of capsaicin production by curdlan and xanthan treated immobilized *Capsicum* cells was 1.8 and 2.0 folds higher than in control. Curdlan and xanthan combination had synergistic influence and elicited 7.9 folds increase in capsaicin production on 14th day of culture. Sodium alginate (0.05%) elicited 1.6 folds increase in capsaicin in free cells over the control on the 10th day of culture. Chitosan enhanced the permeability of capsaicin from the cells to the exterior and also elicited capsaicin synthesis. AS

FOOD ADDITIVES

719

Collins (TH), Little (K) and Pritchard (PE). **Dehydroascorbic acid: Potential oxidising improver in the CBP ?.** *Flour Milling and Baking Research Association Bulletin* (4); 1991; 91-98

Experiments to compare the use of ascorbic acid (AA) with dehydroascorbic acid (DHA) in different mixing machine atm. are described in this article. Lab.-prepared DHA with a purchased commercial sample are compared and the effect of fat-coating on DHA stability and performance are explored. Results concluded that the three DHA samples had similar performance properties in each of the three mixing machine atm. AA and DHA had similar performance when mixing was at atm. pressure or in 60% oxygen, 40% nitrogen. When mixing under partial vacuum, DHA gave improvements in loaf vol., crumb structure, softness and colour compared with AA. Mixing times were longer to 11 wh/kg,

when mixing in air at atm. pressure or 60% oxygen, 40 nitrogen that could be commercial disadvantage over mixing under partial vacuum unless corrected by increasing the speed of the mixing machine. SRA

Antioxidants

720

Empson (K), Labuza (TP) and Graf (E). **Phytic acid as a food antioxidant.** *Journal of Food Science* 56(2); 1991; 560-563

Iron-induced oxidative damage in foods can be inhibited with the use of small amounts of phytic acid. This compound reduced the rate of ascorbic acid degradation and slowed lipid peroxidation in oil-in-water emulsions and in cooked, refrigerated chicken. Phytic acid has been in use as preservative in soybean oil, meat, fish meal pastes, colouring agents and various other foods. SRA

Stabilisers

Gums

721

Yilmazer (G), Carrillo (AR) and Kokini (JL). **Effect of propylene glycol alginate and xanthan gum on stability of O/W emulsions.** *Journal of Food Science* 56(2); 1991; 513-517

This study showed that propylene glycol alginate (PGA) and xanthan (X) affected rheological stability and the degree of stabilization was a function of concn. and ratio of gum used. The change in viscosity and elasticity appeared to be due to kinetics of aggregate formation and breakdown since coalescence was not a major factor as demonstrated by oil droplet size distribution data. SRA

Sweeteners

722

Ott (DB), Edwards (CL) and Palmer (SJ). **Perceived taste intensity and duration of nutritive and non-nutritive sweeteners in water using time-intensity (T-I) evaluations.** *Journal of Food Science* 56(2); 1991; 535-542

This investigation compared the sweet and bitter taste characteristics of aspartame, acesulfame K, and alitame at equisweetness levels with 10% sucrose/water solutions at 22 C using the time-intensity (T-I) sensory technique. Alitame was comparable to sucrose in all taste characteristics. Aspartame had similar taste characteristics to sucrose with the exception of having greater sweet

intensities with longer duration ($P < 0.001$) following sample expectoration. Acesulfame K differed remarkably from sucrose. The sweet attribute of acesulfame K appeared quickly ($P < 0.05$) before sample expectoration. This was followed by a moderately intense and lingering bitter character ($P < 0.001$) which reached max. intensity after sample expectoration. AS

CEREALS

723

Gupta (SK). **Standardization of flour.** *Indian Baker* 22(2): 1991; 24-25

The author recommends for biscuits dry gluten 7.5 - 9.0% in short dough var., 9.0 - 10.0% in hard dough var.; 10.0 - 11.5% in fermented dough var.; for bread 11.0 - 13.0% and for cakes 7.0 - 9.0%. In order to get the specified dry gluten, while mixing two flours of different gluten content, the application of Pearson's square is explained with graph. SD

724

Shah (BG), Malcolm (S), Belonje (B), Trick (KD) and Brassard (R). **Effect of dietary cereal brans on the metabolism of trace elements in a long-term rat study.** *Cereal Chemistry* 68(2): 1991; 190-194

To determine the effect of cereal brans on the metabolism of Fe, Zn, Cu and Mn, a seven-month study was conducted using male and female Sprague-Dawley rats. They were fed diets containing cellulose, oat bran, hard red spring wheat bran, soft white wheat bran, corn bran, or rodent chow at 4 or 14% total dietary fiber. During wk 7 (phase 1) and wk 24 (phase 2), mineral balance studies were conducted. The diet, urine, feces, liver, heart, muscle, kidney and femur were analyzed for the trace elements. Apparent absorption of the minerals decreased from phase 1 to 2, but tissue levels generally increased with age. Tissue levels were generally higher in females than males. Dietary fiber or phytate did not adversely affect apparent mineral absorption or tissue level. In phase 2, liver iron of the male rats fed diets containing higher endogenous iron levels was approx. 50% higher than that of the males fed diets with lower iron levels. The femur zinc levels in rats fed 14% wheat bran fiber were about 15% lower than those of the other rats, despite higher dietary zinc, but this may not be physiologically meaningful. AS

725

Curioni (A), Peruffo (ADB), Pressi (G) and Pogna (NE). **Immunological distinction between x-type and y-type high molecular weight glutenin subunits** *Cereal Chemistry* 68(2): 1991; 200-204

Polyclonal antisera were raised against four high mol. wt. glutenin subunits purified by sodium dodecyl sulphate electroendosmotic preparative electrophoresis from the wheat cv Clara 2. Immunoblotting with total protein extracts and gliadins from several wheat cvs revealed that the antisera to x-subunits 1, 5, and 7 bound only to high mol. wt. glutenin subunits, whereas the antiserum to y-subunit 12 also reacted with α -, β - and γ -gliadins. The antisera to subunits 1 and 5 reacted more strongly with x-subunits than with y-subunits, and the antiserum to subunit 12 showed more reaction with y-subunits. Comparison of amino acid sequences suggests that some antigenic determinants typical of the y-type and x-type subunits lie in the N-terminus and in the central domain of the protein, resp. AS

726

Troncone (R) and Auricchio (S). **Gluten-sensitive enteropathy (celiac disease).** *Food Reviews International* 7(2): 1991; 205-231

Aspects covered in this review are: cereal protein and gluten-sensitive enteropathy (GSE), pathogenesis of GSE (theories of pathogenesis, immunology of GSE (gliadin as antigen, major histocompatibility complex class II in GSE, T cell receptor in GSE, humoral immune response and cell-mediated immune response), models of GSE (*in vitro* models of gliadin toxicity, *in vivo* studies of gliadin toxicity and animal models of GSE), epidemiology, clinical features (a typical presentation and diseases associated with GSE), diagnosis and therapy). 128 references. SRA

Oat

727

Collins (FW), McLachlan (DC) and Blackwell (BA). **Oat phenolics: A venaluminic acids, a new group of bound phenolic acids from oat groats and hulls.** *Cereal Chemistry* 68(2): 1991; 184-189

A new group of phenolic acids was found in aqueous alcoholic extracts of both oat groats and hulls. These acids occurred as conjugates covalently linked to the amine function of several different orthoaminobenzoic acids. One of the conjugates was pale yellow crystalline solid with a mol. wt. of 325 ($C_{18}H_{15}NO_5$). Mass spectral studies revealed an acid composed of $C_{11}H_{10}NO_3$ and a mol. wt. of 190. Structural analysis (1H , ^{13}C nuclear magnetic resonance, ultraviolet, etc) allowed formulation of

the acid as 5-(4'-hydroxyphenyl)-penta-2,4-dienomic acid (i.e., 4'-hydroxycinnamylidene-acetic acid), for which the trival name avenalumic acids proposed. Comparison of proton coupling constants of the naturally occurring conjugate with models suggests that the oat constituent is and interconvertible mixture of the 2-E,4-E and 2-Z,4-E isomers, with the former isomer predominating. This assignment was confirmed by total* synthesis of 2-E,4-E-avenalumic acid. Two additional derivatives of avenalumic acid were also detected: the 3'-hydroxy- and 3'-methoxy analogues. These acids, which are the ethylenic homologues of the well-known p-coumaric, ferulic and caffeic acids, may be widely distributed in cereal grains. AS

Rice

728
Raju (GN) and Srinivas (T). **Effect of physical, physiological and chemical factors on the expression of chalkiness in rice.** *Cereal Chemistry* 68(2): 1991: 210-211

Rice starch

729
Chang (S-M) and Liu (L-C). **Retrogradation of rice starches studied by differential scanning calorimetry and influence of sugars, NaCl and lipids.** *Journal of Food Science* 56(2): 1991: 564-566, 570

Rice starch gels with different amounts of amylose had their own characteristics during storage (25 C). In non waxy rice starches, the retrogradation of the high amylose group was faster than that of the low amylose group at early stages of storage. The storage temp. affected both rate of retrogradation and properties of retrograded starch. The effects of additives on retrogradation of rice was dependent on rice var. and storage conditions. In presence of sucrose, extent of retrogradation increased, while in presence of NaCl, it decreased. Effects of maltose, glucose and lipids were dependent on rice starch gel and storage temp. This study could facilitate improvements and development in processing various rice products. SRA

Rye

730
Gudmundsson (M) and Eliasson (A-C). **Thermal and viscous properties of rye starch extracted from different varieties.** *Cereal Chemistry* 68(2): 1991: 172-177

Thermal and viscous properties of rye starch extracted from different cvs were studied and compared with gelatinization parameters and retrogradation of wheat and maize starches. Gelatinization parameters for the rye starches were shown to be lower than those for wheat starch but similar to those for oat starches (literature value). The transition of the amylose-lipid complex was low, which indicated a low lipid content in the starch. Retrogradation of the rye starch was quite low compared with that of wheat and maize starches despite the low lipid content. The viscous properties of the rye starches were investigated in the 60 - 90 C temp. interval. The rye starches increased in viscosity very differently with increasing temp. and differed in their end-viscosity values after 400 sec holding time at 90 C. The gelatinization parameters, retrogradation (enthalpy value after 14 days of storage), and viscosity (end value after 400 sec at 90 C) were correlated with other measured factors, such as falling number, gel volume, amylose leaching and percentage of fissures on the surface of starch granules. Moderate to high correlation was found between gelatinization enthalpy and falling number, end viscosity and percentage of fissures (0.64, -0.72, -0.95 resp.). Gelatinization temp. correlated moderately with falling number, end viscosity, and gel volume (0.61, -0.85 and -0.70, resp). Falling number also had a moderately high correlation with percentage of fissures and amylose leaching (-0.84 and 0.78). Retrogradation (enthalpy value after 14 days of storage) correlated highly with amylose leaching (0.90). End viscosity correlated highly with percentage of fissures and gel volume (0.91 and 0.79). These correlations helped considerably to explain the thermal and viscous properties of the rye starches investigated. AS

Wheat

731
Gill (KS) and Sekhon (KS). **Production and prospects of durum wheat in India.** *Indian Baker* 21(1): 1990: 25-30

Geographical distribution of durum wheat cultivation in India, and the spread of durum cultivation in India due to the disease Karnal bunt, are briefly reviewed. The characteristics of the durum var. have been illustrated which include grain quality, grain comp., milling quality and the extent of usage of durum wheat in pasta and baked product preparation. 21 references. KAR

732
Bakshi (AK) and Nanda (GS). **Wheat-quality improvement (industrial and nutritional)**

programmes at Punjab Agricultural University to match with changing requirements of millers and processors. *Indian Baker* 21(2); 1990; 21-30

The research conducted at the Punjab Agricultural University aims at providing the right type of wheat for manufacturing different bakery items and variables have been bred for this purpose. Variations have been evolved taking into consideration the milling quality, protein content and dough strength which are suitable for cookie, chapathi and macaroni. Efforts also have been continuing to evolve suitable durum wheat and triticales. KAR

733

Lit (GV). **The quality of quality control.** *Indian Baker* 22(1); 1991; 11-20

Physico-chemical and other quality parameters are determined on small representative wheat samples in order to understand about the bulk. The statistical tools like standard deviation and coeff. of variation playing a vital role in substantiating the reliability of sample means as a true estimate of the bulk are illustrated through various data on impurities, hectolitre wt., moisture, protein and alveograph values. SD

734

Shiiba (K), Negishi (Y), Okada (K) and Nagao (S). **Purification and characterization of lipoxygenase isoenzymes from wheat germ.** *Cereal Chemistry* 68(2); 1991; 115-122

To investigate the mechanism by which lipoxygenase improves the rheological properties of wheat flour doughs, wheat lipoxygenase was extracted first with acetate buffer from wheat germ and fractionated by ammonium sulphate. The lipoxygenase fraction was further purified by diethylaminoethyl (DEAE)-Sephacryl chromatography and then separated into three major isoenzymes (L-1, L-2 and L-3) and a minor isoenzyme (L-a) by carboxymethyl-Sephacryl chromatography. Each isoenzyme was purified by gel filtration and DEAE-Sephacryl chromatography. Sodium dodecyl sulphate-polyacrylamide gel chromatography of these purified isoenzymes exhibited a single band with almost the same retardation factor. These purified lipoxygenase isoenzymes were characterized by enzymatic properties (pH activity profile, thermal sensitivity, substrate specificity, effect of metal ions), amino acid composition, and their effects on wheat flour. After reaction with each purified lipoxygenase isoenzyme, the treated flour exhibited higher foaming activity and lower contents of the sulphhydryl group than did the control flour, which

received no enzyme treatment. The treated flour also showed a shorter dough development time and less resistance after peak time on a mixogram than did the control flour. The flour treated with the L-3 isoenzyme exhibited the highest foaming activity and bread-making quality. AS

735

Izydorczyk (M), Biliaderis (CG) and Bushuk (W). **Comparison of the structure and composition of water-soluble pentosans from different wheat varieties.** *Cereal Chemistry* 68(2); 1991; 139-144

Water-soluble pentosans were isolated from flours of eight wheat var. belonging to several Canadian classes. The pentosans were fractionated by $(\text{NH}_4)_2\text{SO}_4$ precipitation into arabinoxylans and arabinogalactans. The arabinoxylan from flours of Canada western red spring and Canada prairie spring had the lowest degree of branching, and that from the Canada utility class the highest. Among var., the degree of branching of the arabinogalactans was relatively constant, except for the Canada western red spring var. Katepwa, which was substantially lower. The peptide moieties of the arabinogalactans contained high levels of alanine and hydroxyproline. *Cis*- and *trans*-isomers of ferulic acid were found in the arabinoxylans. The ferulic acid content of arabinoxylans from different var. varied significantly; the highest amount was found in the arabinoxylan of the Canada western soft spring var. Fielder. Purified arabinoxylans showed intervarietal differences in the mol. wt. distribution by Sepharose CL-4B chromatography; the arabinoxylan from Katepwa had the highest apparent mol. wt. In contrast, the arabinogalactan-peptide fractions had similar mol. wt. as determined by Sephacryl S-300 gel filtration. AS

736

Izydorczyk (M), Biliaderis (CG) and Bushuk (W). **Physical properties of water-soluble pentosans from different wheat varieties.** *Cereal Chemistry* 68(2); 1991; 145-150

The physical properties of water-soluble pentosans and their constituents, arabinoxylan and arabinogalactan, in solution or gels, were investigated using purified preparations from flours of 8 wheat var.: HY 355, HY 320, Oslo (Canada prairie spring), Glenlea (Canada utility), Fielder (Canada western soft spring), Norstar (Canada western hard red winter), Katepwa (Canada western red spring), and Marshall (a hard red spring var. unregistered in Canada). The intrinsic viscosities for arabinoxylans and arabinogalactans ranged between 2.82 - 4.20 dl/g and 0.045 - 0.062 dl/g, resp. Oxidative gelation of 2% (w/v) pentosan and

arabinoxylan solutions (H_2O_2 and peroxidase) was probed by dynamic rheometry. The most rigid gel networks, as assessed by the storage modulus (G') and $\tan\delta$ (G''/G'), were obtained for the preparations derived from Katepwa, followed by those from HY 355, HY 320 and Fielder. Relatively weak gels were obtained for pentosans from Oslo, Marshall, Norstar, and Glenlea. The storage modulus of arabinoxylan and pentosan gels (2%, w/v) were positively correlated with intrinsic viscosity of the polymers ($r = 0.85$ and $r = 0.83$, resp.; $P < 0.01$). Cross-linked pentosans and arabinoxylans held up to 100g of water per gram of carbohydrate. Although both arabinoxylans and arabinogalactans reduced the surface tension of water, only arabinoxylans effectively stabilized protein foams on heating. AS

Wheat products

737
Kanwaljit Kaur and Geervani (P). **Role of product quality in propagation of wheat based foods.** *Indian Baker* 21(1); 1990; 19-24

The areas that need strengthening for the popularization of wheat based products are indicated. These include maintaining the milling quality, raw materials quality, sensory quality, nutritional quality and storage quality. The techniques involved in the preparation of wheat based products also play an important role in the popularisation of the product. SRA

738
Arya (SS). **Wheat based traditional Indian foods.** *Indian Miller* 21(3); 1990; 17-22

The wheat based Indian traditional products reviewed are chapathies parothas and puris covering the work done for extension of shelf-life by suitable preservation, irradiation and by providing suitable package; suitability of var. for chapathi making and mechanisation of chapathi making process. Fried wheat snacks are another type of traditional preparation in which are included shankarapara, namkeenpara, cuziya, holige, modaka, mathi, samosha, kuchori, sev muttor and others. Efforts made in preparing the instant mixes for some traditional products and the problems encountered in storage of such mixes have been elaborated. Wheat based traditional sweet preparation have also been included covering different products like balusdahi, jalebi, chiroti, pheni, ghevar, sohan papdi, gulab jamun and others. SRA

Wheat flour

739

Narasihman (KS). **Infestation control strategies in wheat flour milling industry.** *Indian Baker* 21(2); 1990; 31-40

This paper has indicated the places and sources of infestation in a flour mill and the effect of infestation on the wheat flour quality and the products prepared from them. Measures have been suggested to control infestation in flour mill including proper sanitation; aspiration, scoverting and impact, and finally fumigation. Local or spot fumigation is needed for the equipment and machinery. General fumigation is needed for stocks and the fumigants available in India have been listed along with the dosages, mill fumigation and prophylactic measure have also been covered. KAR

740

Batey (IL), Gupta (RB) and MacRitchie (F). **Use of size-exclusion high-performance liquid chromatography in the study of wheat flour proteins: An improved chromatographic procedure.** *Cereal Chemistry* 68(2); 1991; 207-209

Wheat proteins

741

MacRitchie (F), Kasarda (DD) and Kuzmicky (DD). **Characterization of wheat protein fractions differing in contributions to breadmaking quality.** *Cereal Chemistry* 68(2); 1991; 122-130

Protein fractions from 6 wheat cvs, 3 of good quality and 3 of poor quality, were prepared by fractional extraction of gluten with dilute hydrochloric acid, and the relationship between breadmaking functionality and protein composition was investigated. Functionality was assessed by adding fractions to a base (reference) flour at a level of 1% (protein to flour wt.) and measuring mixograph peak development times and loaf volumes in an optimized baking test. Protein composition was measured by sodium dodecyl sulphate-polyacrylamide gel electrophoresis under reducing and non-reducing conditions, followed by densitometry of the stained patterns. The pattern areas of reduced fractions, which corresponded to total proteins, were divided into subareas representative of five main protein classes: high mol. wt. glutenin subunits; ω -gliadins; low mol. wt. subunits; α -, β -, and γ -gliadins; and albumins plus globulins. Also, the proportion of glutenin in each fraction was estimated for some cvs, as the difference between the total area under the densitometer tracing of the pattern of a fraction reduced (total proteins) and the total area under the densitometer tracing of the pattern of the same fraction unreduced (from which essentially only monomeric proteins enter the gel). The proportion

of high mol. wt. glutenin subunits in the parent glutens increased in accordance with dough strength and, with one exception, loaf volume. As the fraction number increased, the proportion of glutenins generally paralleled the increases observed in dough development time and loaf volume, except for some of the later fractions. AS

Gliadins

742

Il (B), Daun (H) and Gilbert (SG). **Water sorption of gliadin.** *Journal of Food Science* 56(2): 1991: 510-512, 531

Crude wheat gliadin from acetic acid solution showed lower water sorption by pulse and frontal Inverse Gas Chromatography methods as compared to a static method but the pulse data for a highly purified Ponca wheat gliadin from ethanol agreed with static data for crude gliadin. Use of ethanol for dissolving gliadins for IGC column preparation gave sorption equivalent to the static method whereas acetic acid-treated gliadin showed lower water uptake. Acetic acid may compete with water for hydrogen bonding sites on the protein or change the secondary structure to make some hydrophilic sites unavailable. The static method resulted in loss by diffusion of the sorbed acetic acid. AS

MILLETS

Corn

743

Ling (D) and Jackson (DS). **Corn wet milling with a commercial enzyme preparation.** *Cereal Chemistry* 68(2): 1991: 205-206

Corn meals

744

Bookwalter (GN), Lyle (SA) and Nelsen (TC). **Enzyme inactivation improves stability of self-rising corn meals.** *Journal of Food Science* 56(2): 1991: 494-496

A new process to inactivate lipid-affecting enzymes in whole corn, by adjusting whole dent corn to 15% moisture and gradually heating it to 91 or 96 C during passage through a two-stage steam jacketed conveyer, followed by cooling. Self-rising corn meals formulated with 91 or 96 C heat processed corn were more stable upon storage, as shown by decreased fat acidity, increased CO₂ retention and improved uniformity and loaf vol. in corn bread. BV

Corn proteins

745

Wang (CR) and Zayas (JF). **Water retention and solubility of soy proteins and corn germ proteins in a model system.** *Journal of Food Science* 56(2): 1991: 455-458

The independent effects of pH and incubation temp. on water retention (WR) and protein solubility (PS) of soy proteins and corn germ protein flour (CGPF) were significant at $P < 0.05$, except for WR of soy isolate (SI). High WR and PS were obtained with no significant ($P < 0.05$) incubation time effect for all samples in 10 to 30 min. WR related to protein content was higher in CGPF than in the three SP. PS increased with increasing pH from 6 to 8. Highest PS was in the SI and lowest in CGPF and increased with increase in incubation temp. (30 - 70 C) in all samples. SRA

Pearl millet

746

Klopfenstein (CF), Leipold (HW) and Cecil (JE). **Semiwet milling of pearl millet for reduced goitrogenicity.** *Cereal Chemistry* 68(2): 1991: 177-179

It is well established that pearl millet grain (*Pennisetum glaucum*: syn., *P. typhoides*, *P. americanum*) is goitrogenic, mainly because of its C-glycosylflavone content. Conc. of the antithyroid compounds have been found to be much higher in the bran than in the endosperm portions of the grain. Traditional dry-roller milling processes are not very efficient at fractionating the grain because of its small size and firmly embedded germ. Therefore, semiwet roller milling was used to separate the grain into flour, shorts, red dog, and bran fractions. Rat-feeding studies showed that the semiwet milling process (in which 25% of the grain was removed as bran) successfully removed the antithyroid properties, as demonstrated by patterns of serum thyroid hormones and thyroid histopathology. Nearly all previous studies have used gray-seeded pearl millet. This study showed that brown- and yellow-seeded pearl millet also had antithyroid effects. Although flavone concn. was higher in the yellow than in the brown millet, antithyroid effects seemed somewhat less severe for the yellow millet, indicating differences in antithyroid potency and/or concn. for the 3 C-glycosylflavones that have been identified in pearl millet grain. AS

Pearl millet flour

747

Akingbala (JO). **Effect of processing on flavonoids in millet (*Pennisetum americanum*) flour.** *Cereal Chemistry* 68(2); 1991: 180-183

Pigments of pearl millet flour had max. absorbance at 355 nm. The absorbance and C-glycosylflavanol content varied among 17 millet varieties. Absorbance was 0.72 and 0.91 mg/100 g, and C-glycosylvitexin equivalent was 76.6 and 275.7 mg/100 g for Ghana and Ancateurs samples, resp. Increasing levels of decortication from 0 to 50% progressively reduced both absorbance and flavanol concn., but rates differed among samples. Cooking also reduced the absorbance and flavanol content of flour more than did steeping in acid or sour milk. AS

Sorghum

748

Ogundiwin (JO) and Ilori (MO). **Development of stout from sorghum malt.** *Lebensmittel-Wissenschaft und -Technologie* 24(2); 1991: 182-185

Stout drinks were developed from sorghum malt and sugar. Bitter leaf (*vernonia amygdalina*) extract and residue were used as hop substitutes for flavouring. Roasting sorghum malt at 200 C for 4 h gave an optimum colour, flavour and taste. The addition of 30 g bitter leaf extract and 2 g bitter leaf residue were appropriate for flavouring the wort during boiling. Also addition of 18% sugar adjunct to sorghum wort and 17% v/v caramel to the fermented wort were optimum for stout production. The alcoholic content, original gravities and apparent extracts of the stout drinks produced with SSV3 sorghum malt and 18% sugar were essentially the same as those of a commercial stout. All the stout samples were rated the same as a commercial stout in terms of flavour, colour and foam retention. AS

PULSES

749

Samuel (DVK), Amar Singh and Ilyas (SM). **Pulse dehuller-cum-splitter.** *Invention Intelligence* 25(2); 1990: 88-89

A simple, low-cost machine to remove the outer layer of pulse and to split it into two parts is reported in this paper. The machine was tested on soybean, Bengal gram and pea satisfactorily. The dehulling efficiencies of 94, 97 and 98% resp. were achieved

with a capacity of 125 - 140 kg/h at the peripheral speed of 10.99 m/sec. The electricity consumption of machine was 2.15 W-h/K of pulses. This machine was also used for dehulling and splitting cleaned and graded redgram, greengram and blackgram and found the efficiency was over 98% with 10% broken for all these pulses. The multipurpose and portable machine costs about Rs. 3000, excluding the cost of the prime mover. SRA

750

Gujska (E) and Khan (K). **Functional properties of extrudates from high starch fractions of navy and pinto beans and corn meal blended with legume high protein fractions.** *Journal of Food Science* 56(2); 1991: 431-435

Blending of corn meal or a high starch fraction of navy or pinto beans with the high protein fractions (HPF) gave a better expanded product with modified functional properties. Higher protein content reduced puffing resulting in a more dense product but extruded blends were softer and more fragile than extrudates from corn and high starch fraction (HSF). Expansion properties, water absorption index (WAI) and oil absorption (OAC) were better from combinations of corn blended with HPF upto 20% than from blends of bean fractions. Colour of extruded blends was not affected by protein content. When hull fraction was added to the HSF, some functional properties changed and the extruded product was less fragile and more dense than those without hull. Any of the corn/HPF, HSF/HPF blends could be of use in food applications. SRA

751

Hentges (DL), Weaver (CM) and Nielsen (SS). **Changes of selected physical and chemical components in the development of the hard-to-cook bean defect.** *Journal of Food Science* 56(2); 1991: 436-442

Cowpeas and beans stored at 29 C, 65% rh required prolonged cooking times; however, seeds stored in other conditions (5 C, 30% rh; 29 C 30% rh; and 5 C, 65% rh) maintained short, stable cooking times throughout storage. Several components appeared related to development of the hard-to-cook defect. During soaking, cowpeas and beans requiring long cooking times had decreased phytate and water-soluble (high methoxyl) pectin, and increased leaching of solids. This supports the proposed theory of the hard-to-cook defect involving phytate-mineral and mineral-pectin interactions. Phytase activity decreased during storage. Starch and protein also play roles in development of the defect since decreased starch and protein solubilities were observed in hard-to-cook legume seeds. SRA

752

Gujaska (E) and Khan (K). **Feed moisture effects on functional properties, trypsin inhibitor and hemagglutinating activities of extruded bean high starch fractions.** *Journal of Food Science* 56(2): 1991: 443-447

The results of the exp. showed that quality of navy, pinto and garbanzo beans high starch fractions extrudates could be changed by moisture content during extrusion. Moisture content affected the expansion index (EI), water solubility index (WSI), nitrogen solubility index (NSI) and colour of extruded beans HSF. Navy bean HSF had optimum moisture 27%, and garbanzo bean HSF about 26%. Pinto bean HSF had the best expansion at 20% moisture but other properties improved at higher moisture levels (28 - 30%). The extrusion process reduced trypsin inhibitor activity by about 70 - 85%, the level of decrease determined by moisture content of starting material and temp. Extrusion temp. of 121, 132 and 150 C inactivated hemagglutinating activity of navy, pinto and garbanzo beans. SRA

753

Richardson (JC) and Stanley (DW). **Relationship of loss of membrane functionality and hard-to-cook defect in aged beans.** *Journal of Food Science* 56(2): 1991: 590-591

Black gram

754

Ghazali (HM) and Cheng (SC). **The effect of germination on the physico-chemical properties of black gram (*Vigna mungo* L.).** *Food Chemistry* 41(1): 1991: 99-106

Protein and fat content decreased and vitamin C increased in germinated black gram seed and the latter decreased after 1 day stored germinated seed. Total carotenoid, high in dry seed, decreased substantially on soaking but marginally increased on germination. Simple sugar, high in dry seed was lost on soaking but increased on germination. SD

Cowpeas

755

Uzogara (SG), Morton (ID) and Daniel (JW). **Thiamin, riboflavin and niacin retention in cooked cowpeas as affected by kanwa treatment.** *Journal of Food Science* 56(2): 1991: 592-593

Results showed that cooking of cowpeas (100 C) in Kanwa (a Nigerian local tenderizer) or NaHCO₃ decreased levels and retention of vitamins (thiamin,

riboflavin and niacin). No significant difference in levels of vitamins in Kanwa-cooked cowpeas from those in NaHCO₃ cooked samples. In alkaline cooking process retention of thiamine ranged between 15 - 20%, niacin 26 - 49%, and riboflavin 53 - 64%. Pressure cooking (121 C) of beans or soaking combined with boiling (100 C) improved retention of vitamins in the cooked product. SRA

756

Akinyele (IO) and Akinlosote (A). **Effect of soaking, dehulling and fermentation on the oligosaccharides and nutrient content of cowpeas (*Vigna unguiculata*).** *Food Chemistry* 41(1): 1991: 43-53

Chemical changes studied with 2 cvs of cowpea, fermented (24 h), or soaked (4 h) or dehulled showed that verbacose decreased significantly in all the treatments, stachyose decreased moderately in soaking (29.8%) and dehulling (16.9%), raffinose decreased significantly in dehulling (56%), sucrose increased moderately in soaking (41.9%) and dehulling (45.9%), fructose increased in fermentation (105%) and soaking (43%) and glucose/galactose increased in fermentation (56.4%) but decreased in both soaking (55%) and dehulling (63.6%). All the treatments are effective in decreasing the flatulence properties in cowpeas and increasing the consumer acceptability. SD

Navy beans

757

Kohnhorst (AL), Smith (DM), Uebersax (MA) and Bennink (MR). **Production and characterisation of a protein concentrate from navy beans (*Phaseolus vulgaris*).** *Food Chemistry* 41(1): 1991: 33-42

A modified isoelectric precipitation method of Fan and Sosulki with increased centrifugation speed of 15000 x g yielded 83.9% protein content from dry bean flour whereas salt fractionation method resulted in low conc. yield. The major protein was a 7S protein with three subunits of about 45 - 48 kDa typical of vicilin and 10% of protein was in the form of a 60 kDa fraction. SD

OILSEEDS AND NUTS

Coconuts

758

Menon (ARS) and Madhavan (K). **Copra dryers - versatile machines for the monsoon periods.** *Indian Coconut Journal* 22(1): 1991: 6-9

Various machines for copra drying during the monsoon periods like the small holder's dryer using agricultural waste as fuel; large size copra dryer; solar cabinet dryer and electrical dryer are discussed. The performance data of the various types of dryers are also summed up. CSA

Groundnuts

759

Singleton (JA) and Pattee (HE). **Peanut moisture/size, relation to freeze damage and effect of drying temperature on volatiles.** *Journal of Food Science* 56(2): 1991; 579-581

Moisture levels and seed size both contribute to chemical changes in freeze damaged peanuts. Even at 25% overall moisture peanuts were susceptible to freeze damage. Also increased drying temp. accentuated the chemical changes caused by freeze damage. SRA

Soybeans

760

Sulebele (GA). **Soybean processing industry. An update.** *Indian Food Industry* 10(2): 1991; 23-26

This article presents a statistics of the state-wise area and production of soybean in India; state-wise capacity of soybean processing plants; area, production, processing and export of soybean extraction or meal; export of oilmeals, oilseeds, and minor oils and country-wise export of soybean extraction/meal. Future scenario of the soybean processing industries are also discussed. CSA

761

Sheu (SC) and Chen (AO). **Lipoxygenase as blanching index for frozen vegetable soybeans.** *Journal of Food Science* 56(2): 1991; 448-451

Lipoxygenase (LIP) was more suitable as blanching index than peroxidase (POD) for freezing vegetable soybeans with and without pods. Results showed no significant differences in sensory quality during 160-day frozen storage, while both treatments were significantly different from unblanched samples. Vitamin C in samples using LIP as blanching index was higher than that in unblanched ones but not significantly different from that in samples using POD as an index. Samples using LIP had 11.5% POD activity but no LIP activity, while blanched samples using POD had no LIP or POD activities during storage. Blanching conditions suggested by

this study were 1 min at 100 C for vegetable soybeans with pods and 50 sec at 95 C without pods. SRA

Soy products

Soy milk

762

Vijayvaragiya (RR) and Pai (JS). **Lowering of lipoxygenase activity in soy milk preparation by propyl gallate.** *Food Chemistry* 41(1): 1991; 63-67

Lipoxygenase activity of soy milk tested with different levels of antioxidants showed that propyl gallate in combination with citric acid and ascorbic acid caused more inhibition than BHA, BHT and ascorbic acid. SD

Soy proteins

763

Shih (FF). **Effect of anions on the deamidation of soy protein.** *Journal of Food Science* 56(2): 1991; 452-454

Soy protein (SP) were deamidated in the presence of various common anions and changes in physicochemical and functional properties were determined. It was found that SP deamidation could be accelerated in the presence of phosphate or bicarbonate anions. Borate anions were much less effective while acetate, sulphate and chloride anions were totally ineffective. Significant deamidation (> 30%) was normally accompanied by significant peptide bond hydrolysis (> 3%). Deamidated SP isolate with up to 4.5% peptide bound hydrolysis had greatly improved solubility, foam activity and ability to emulsify oil. SRA

Sunflowers

764

Mok (C) and Hettiarachchy (NS). **Heat stability of sunflower-hull anthocyanin pigment.** *Journal of Food Science* 56(2): 1991; 553-555

Anthocyanin pigment was extracted from hulls of a sunflower genotype, Neagra de Cluj, using aqueous SO₂ solutions of varying concn. Thermal stability of the pigment was studied between 65 - 95 C, and pH 1.0 - 5.0. Thermal degradation of the pigment followed first order kinetics. Calculated activation energy was 23.1 plus or minus 2.2 kcal/mole. Extraction of hulls with 1000 p.p.m. SO₂ solution

gave highest anthocyanin content and best thermal stability. The pigment was most stable at pH 3.0. AS

TUBERS AND VEGETABLES

765

Sapers (GM), Miller (RL), Douglas (FWJr) and Hicks (KB). **Uptake and fate of ascorbic acid-2-phosphate in infiltrated fruit and vegetable tissue.** *Journal of Food Science* 56(2): 1991: 419-422, 430

Ascorbic acid-2-phosphate (AAP) and ascorbic acid (AA) were infiltrated into apple and potato tissue to control browning. Apple tissue absorbed more AAP and AA than potato under similar conditions. AAP hydrolysis by endogenous acid phosphatase (APase) yielded AA which accumulated or became oxidized to dehydroascorbic acid, depending on the rate of hydrolysis and browning tendencies of samples. APase activity varied greatly with commodity, method of sample preparation and sample pH. Variation in the ability of AAP to inhibit browning in different products could be explained by these factors. AS

766

Garleb (KA), Bourquin (LD) and Fahey (GCJr). **Galacturonate in pectic substances from fruits and vegetables: Comparison of anion exchange HPLC with pulsed amperometric detection to standard colorimetric procedure.** *Journal of Food Science* 56(2): 1991: 423-426

A HPLC method was developed to identify and quantify galacturonate; results were compared with those from a standard colorimetric procedure. HPLC was also used to determine neutral monosaccharide profile of isolated pectic substances (PS). The PS, isolated with ammonium oxalate from the total dietary fiber of apple, cucumber, celery, grapefruit and radish, were analyzed. Mean PS on original dry matter basis ranged from 6.0 plus or minus 0.51% for apple to 18.5 plus or minus 0.1% for celery. Galacturonate of isolated PS determined using anion exchange chromatography coupled with pulsed amperometric detection was not significantly different ($P > 0.2$) from that determined colorimetrically. Major monosaccharides in PS of all substrates were arabinose and galactose. Rhamnose, xylose and glucose also were detected in certain sources in much lower amounts. This HPLC method allows precise quantification of galacturonate and will be useful tool for study of chemical composition of pectin. AS

767

Albrecht (JA), Schafer (HW) and Zottola (EA). **Sulfhydryl and ascorbic acid relationships in selected vegetables and fruits.** *Journal of Food Science* 56(2): 1991: 427-430

Selected vegetables and fruits were analyzed for ascorbic acid, total sulphur, and sulfhydryl-containing (-SH) fractions, shortly after harvest and after 3 wk storage at 2 C and 95-100% rh. More than 95% of the original ascorbic acid content was retained in broccoli and brussels sprouts. Ascorbic acid stability in fruits appeared to be due to low pH but that did not explain high retention in broccoli and brussels sprouts. Initial ascorbic acid correlated with total sulphur ($r = 0.909$). Weaker correlations were found between total -SH and protein -SH fractions and ascorbic acid content ($r = 0.626$ and 0.627). The quantity of sulfhydryl containing compounds did not explain ascorbic acid retention mechanisms of the vegetables. AS

Onions

768

Thomas (DJ) and Parkin (KL). **Immobilization and characterization of C-S-lyase from onion (*Allium cepa*) bulbs.** *Food Biotechnology* 5(2): 1991: 139-159

Immobilized form of C-S-lyase (cysteine sulfoxide lyase EC 4.4.1.4) had similar properties like free enzyme with regard to pH dependency of activity and stability and efficiency (K_m) in utilization of substrates. It allows for allium flavour production upon demand by combining the enzyme and its substrate(s). The aroma produced by this system was fresh and characteristics than that derived from processed allium products. SD

Beet

769

Ralet (M-C), Thibault (J-F) and Valle (GD). **Solubilization of sugar-beet pulp cell wall polysaccharides by extrusion-cooking.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 107-112

Sugar-beet pulps were extruded under various conditions with a twin-screw extruder Cleextral BC 45. Properties of hydration were not significantly changed after extrusion-cooking treatment. However, water solubility increased from 16.6 to 47.5% with increasing severity of treatment. Pectic substances with a high degree of esterification and high neutral sugar content were the main

polysaccharides solubilized. Their viscosity-average mol. wt. was lower than that of pectins extracted by acidic treatment. AS

Carrots

770

Bolin (HR) and Huxsoll (CC). **Control of minimally processed carrot (*Ducus carota*) surface discoloration caused by abrasion peeling.** *Journal of Food Science* 56(2): 1991: 416-418

Low pH citric acid (2%, 70 C) dip provided a quick and easy way for treating abrasion peeled carrots to inhibit formation of the objectionable white lignification material formed on their surface during storage. No flavour changes were observed. BV

Cassava

771

Tufail (M) and Gowdh (CV). **Nutritive value of raw and processed tapioca meal.** *Poultry Guide* 28(7): 1991: 17-21

Tapioca chips were subjected to simple processing techniques like autoclaving and boiling. A part of raw tapioca chips were coarsely ground and autoclaved at 1.1 kg/cm for 15 min. The material was cooled, dried and stored as autoclaved tapioca meal. The other part of tapioca chips were boiled in sufficient amount of water (1:3 w/r) till it was cooked. This was studied and stored as boiled tapioca meal. The samples were analysed for moisture, crude protein, total ash, acid insoluble ash, ether extract, crude fibre, Ca and P. Crude protein and crude fibre were higher in raw tapioca meal. Total ash and acid insoluble ash were higher in the raw tapioca meal than the processed tapioca meal. Ether extract, Ca and P were almost similar in both raw and processed tapioca meals. The nitrogen corrected metabolizable energy values for raw autoclaved and boiled tapioca meal were 3130, 3390 and 3334 Kcal/Kg resp. The hydrocyanic acid content was higher in raw tapioca and reduced by autoclaving and boiling i.e. 98.80 and 99.22% resp. GS

Potatoes

772

Sarikaya (A) and Ozilgen (M). **Kinetics of peroxidase inactivation during thermal processing of whole potatoes.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 159-163

A simple kinetic model was developed to simulate peroxidase deactivation in whole potatoes during blanching. Simulation of the unsteady state temp. profile development in the tubers was accomplished considering the shape of a tuber similar to a sphere. Peroxidase consisted of heat stable and heat labile isoenzymes. Effects of temp. variations on inactivation of these isoenzymes were modelled with the Arrhenius expression. A trial and error computation scheme was used to predict apparent thermal diffusivity of the potatoes and activation energies of the isoenzymes. Numerical values of these parameters were in agreement with previously published studies. AS

773

Seetharaman (K) and Mondy (NI). **Isopropyl N-(3-chlorophenyl) carbamate (CIPC) effect on nitrogenous constituents of potatoes.** *Journal of Food Science* 56(2): 1991: 532-534

Potatoes treated with 1% or 3% CIPC and stored 16 wks at 5 C and 20 C were analyzed for nitrogenous constituents. Treatment with 1% CIPC significantly ($p < 0.025$) increased total nitrogen and protein content in tubers of two cvs compared to untreated control tubers following storage at 5 C and 20 C. Treatment with 3% CIPC increased total nitrogen and decreased protein in tubers stored at 20 C ($p < 0.025$), but decreased total nitrogen and protein in tubers stored at 5 C. Treating potatoes with CIPC prevented sprouting in both var. and apparently caused the tuber to retain nitrogen. AS

774

Califano (AN) and Calvelo (A). **Thermal conductivity of potato between 50 and 100 C.** *Journal of Food Science* 56(2): 1991: 586-587, 589

Results of this study showed that thermal conductivity (TC) ranged from 0.545 to 0.957 W/m C for potatoes (cv Kennebec) sp. gr. 1070 kg/m³ and moisture 80%. Experimental values agreed with reported values. TC, K varied with temp. in a quadratic polynomial form, and an empirical relationship was estimated. A model based on the concept of thermal resistance in parallel was compared with experimental results. These were used in heat transfer model that simulated potato frying. Measured and simulated time-temp. curves showed good agreement. SRA

Vegetables

Cucumbers

775

Chavasit (V), Hudson (JM), Torres (JA) and Daeschel (MA). **Evaluation of fermentative bacteria in a model low salt cucumber juice brine.** *Journal of Food Science* 56(2): 1991; 462-465

Bifidobacterium bifidum, *Lactobacillus casei*, *Lactobacillus plantarum*, *Lactococcus diacetylactis*, *Leuconostoc mesenteroides*, *Leuconostoc oenos*, *Pedlococcus pentosaceus* and a mixed culture of *Propionibacterium shermanoo* and *P. pentosaceus* were used to ferment a model low salt (2.5% NaCl) cucumber juice brine at 22 - 26 C for 39 days. Percent sugar fermented ranges from 16.2 to 87.7. Substrates were citric acid, fructose, glucose and malic acid. Fermentation products quantitated were acetic acid, acetoin, ethanol, lactic acid, mannitol, and propionic acid with percent carbon recovery varying from 71.1 to 101.1. Final pH ranged 3.24 to 4.12. Each fermentation differed quantitatively in substrates and products formed suggesting use of these bacteria as cultures to ferment low salt brined cucumbers and generate a variety of unique organoleptic properties. AS

Leafy vegetables

Brussels sprouts

776

Walker (JL), McLellan (KM) and Robinson (DS). **Isolation and purification of superoxide dismutase purified from brussels sprouts (*Brassica oleracea* L. var. *bullata* sub var. *gemmifera*).** *Food Chemistry* 41(1): 1991; 1-9

Brussels sprouts superoxide dismutase, characterized as CuZn-SOD, consisted of 2 major isoenzymes, pI 4.5 and 4.7, A (two possible subunits MW 16000 and 19000, more stable to heat) and B (subunit approx. MW 16000) with different thermal inactivation properties. SD

Lettuces

777

King (ADJr), Magnuson (JA), Torok (T) and Goodman (N). **Microbial flora and storage quality of partially processed lettuce.** *Journal of Food Science* 56(2): 1991; 459-461

Partially processed stored lettuce (*Lactuca sativa*) showed an increase in microbial flora, pH and

change in package atm. composition (increasing CO₂ and decreasing O₂). The bacterial count varied greatly depending on number of outer leaves removed and the kind of processing and packaging. Typical initial log₁₀ counts/g were: bacteria 3, 4 - 5.1, yeasts 2.5 - 3.2; and infrequent molds. Commercial packaging inhibited bacterial growth and retarded browning. *Pseudomonas*, *Erwinia* and *Serratia* were the most frequently isolated bacteria. *Cryptococcus*, *Pichia*, *Torulaspora* and *Trichosporon* spp. were the most common yeasts. SRA

Pumpkins

778

Odoemena (CS). **Effect of sprouting on carbohydrate content of fluted pumpkin seed.** *Food Chemistry* 41(1): 1991; 107-111

Sprouting markedly decreased the carbohydrate and increased the total soluble sugar concn. in fluted pumpkin (*Telfairia occidentalis* Hook F.) seed. Dormant fluted pumpkin seed consisted mostly sucrose, small amounts of glucose, fructose, galactose, raffinose and stachyose while sprouted seed contained mostly glucose, fructose, maltose, small amounts of sucrose and another unidentified sugar. SD

FRUITS

Apples

779

Yahia (EM), Liu (FW) and Acree (TE). **Changes of some odour-active volatiles in low-ethylene controlled atmosphere stored apples.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991; 145-151

The effect of low-ethylene controlled atm. storage (LCA) on the production of 22 odour-active volatiles in 'McIntosh' and 'Cottrland' apples was investigated. Aldehydes and acetates were not affected while butanoates, 2-methyl butanoates, pentanoates and hexanoates were either severely or completely suppressed under LCA storage. However, most volatiles were produced normally during ripening of the fruit after LCA storage. Although several volatiles were produced at a lower rate during ripening of the fruit in air after LCA than during ripening immediately after harvest, this cannot be attributed entirely to the action of LCA. Volatiles that were found to be suppressed by the action of LCA (3% O₂ + 3% CO₂ + 94% N₂ at 3.3 C, 1-6 p.p.m. ethylene, for up to 8 months) are methyl butanoate,

propyl butanoate, outyl 2-methylbutanoate, hexyl 2-methylbutanoate, butyl hexanoate and hexyl hexanoate. AS

Avocados

780

Ronen (R), Zauberman (G), Akerman (M), Weksler (A), Rot (I), Fuchs (Y). **Xylanase and xylosidase activities in avocado fruit.** *Plant Physiology* 95(3): 1991: 961-964

Mature avocado (*Persea americana* Mill) fruits from different cvs were analysed for xylanase and xylosidase activity when monitored on the day of harvest during the season at 1 month intervals. xylanase activity decreased and xylosidase activity increased between January and February and then remained stable until May. When monitored during the ripening process, xylanase activity was constant and xylosidase activity reached a peak at the climax of ethylene evolution and cellulase activity. Xylanase, which originated from *Trichoderma viride* and was added to the medium in which avocado discs were incubated induced ethylene evolution. GS

Lychee

781

Lee (HB) and Wicker (L). **Anthocyanin pigments in the skin of lychee fruit.** *Journal of Food Science* 56(2): 1991: 466-468, 483

The anthocyanins in the skin of lychee fruit were isolated and purified by Sephadex G-25 and LH-20 gel column chromatography, and Sep-Pak C-18 cartridge. Further separation by HPLC on a C-18 column, on-line spectra by photodiode array detection, and acid and alkali hydrolyses were used for identification. Cyanidin-3-rutinoside was the major anthocyanin found. Cyanidin-3-glucoside and malvidin-3-acetylglucoside were also identified. Polymerized anthocyanin pigment was also present, appearing to contribute to the brownish-red colour. AS

Oranges

782

Shaw (PE), Moshonas (MG) and Pesis (E). **Changes during storage of oranges pretreated with nitrogen, carbon dioxide and acetaldehyde in air.** *Journal of Food Science* 56(2): 1991: 469-474

Hamlin, Pineapple and Valencia oranges were stored in controlled atm. (CA) of nitrogen, carbon dioxide or 0.1 - 0.7% acetaldehyde in air 8 - 24 h and

changes in seven volatiles during 0 - 8 days determined by gas chromatography. Increases in acetaldehyde, ethyl acetate, ethyl butyrate and ethanol were noted in samples after nitrogen or carbon dioxide CA storage with max. increase 1 - 2 days after treatment. Methanol, methyl butyrate and hexanal were unchanged. Flavour evaluations of control versus treated juice showed no consistent changes from any treatment. Acetaldehyde vapours had little effect on flavour or composition, except for Hamlins, where acetaldehyde and ethyl butyrate levels increased. AS

783

Hart (HE), Parish (ME), Burns (JK) and Wicker (L). **Orange finisher pulp as substrate for polygalacturonase production by *Rhizopus oryzae*.** *Journal of Food Science* 56(2): 1991: 480-483

Orange finisher pulp (OFP), a by-product of orange juice processing forms a suitable substrate for production of polygalacturonase (PG) by *Rhizopus oryzae* (ATCC 24563) via solid state fermentation. OFP contained 3.3% pectin on a wet basis which was suitable for production of PG by *R. oryzae*. PG activity was indicated by increase in liquefaction and uronic acid solubilization and subsequent decrease in pectin content of the solid fraction over a 5-day fermentation. Partial characterization of the enzyme extract indicated pH optimum 5.0 for PG. Viscosity and reducing sugar measurements suggested endohydrolytic activity. Little or no pectinesterase, pectin or pectate lyase activities were detected; therefore potential for direct utilization of the PG exists in the citrus industry. SRA

Raspberries

784

Plowman (JE). **Sugars and acids of raspberries, blackberries and other brambles.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 113-115

Ripe berries of 6 cvs of raspberries, 3 of blackberries and one each of boysenberry and loganberry were analysed for sugars and acids in three crop yrs. If the invertase activity of bramble berries was inactivated shortly after picking to prevent transformations of sugars, then distinct contrasted differences of concn. of sugars were found for raspberries and for blackberries. Raspberries were characterized by a glucose:fructose ratio of about 0.77, with sucrose representing 27 - 45% of the total sugars by wt. Blackberries had a glucose:fructose ratio of about 1.0 and sucrose represented only 10% by wt. of the total sugars. Citric acid was the major

acid of raspberries, with malic present at a much lower concn. Two different acid profiles were identified for blackberries, one consisting of isocitric acid and malic acid but without citric acid, and the other dominated by citric acid with malic and isocitric acid present at lower concn. Boysenberries were close to blackberries in both sugar and acid profiles whereas loganberries had a blackberry-like sugar profile and a raspberry-like acid profile. AS

CONFECTIONERY, STARCH AND SUGAR

785

Rico-Pena (DC) and Torres (JA). **Sorbic acid and potassium sorbate permeability of an edible methylcellulose-palmitic acid film: Water activity and pH effects.** *Journal of Food Science* 56(2): 1991: 497-499

The apparent permeability constants for potassium sorbate and sorbic acid through an edible film composed of methylcellulose and palmitic acid (wt. ratio 3:1) were evaluated as a function of water activity (a_w) and pH. For films with thickness 55 - 66 μm , potassium sorbate permeability increased from 2.3×10^{-10} to 2.0×10^{-8} ($\text{mg}/\text{sec cm}^2$)(cm)/(mg/mL) as a_w increased from 0.65 to 0.80. Films were not stable at a_w levels above 0.80. Permeability of the film to sorbic acid at a_w 0.8 decreased from 3.3×10^{-8} to 9.1×10^{-10} ($\text{mg}/\text{sec cm}^2$)(cm)/(mg/mL) as pH increased from 3 to 7. At pH 3 undissociated acid was 97.5% and at pH 7 it was 0.4%. AS

Confectionery

786

Suzuki (S) and Okada (Y). **Recent trend and new usage of containers for confectioneries.** *Packaging Japan* 12(63): 1991: 40-44

This article reports the recent trend and new usage of containers such as the magic top, C-pet, pilopack, Al metalized films, A-pet, standing pack, bakery tray and bag with fastner for confectioneries together with an explanation about the raw materials from which any added value can be obtained. CSA

787

Nelson (KL) and Fennema (OW). **Methylcellulose films to prevent lipid migration in confectionery products.** *Journal of Food Science* 56(2): 1991: 504-509

Films of methylcellulose ranging in thickness from 0.2 to 1.0 mil (0.0051 to 0.025 mm), and exposed to peanut oil at 30 C and 5 psig pressure differential,

allowed less than 1.0 μg linoleic acid equivalents. $\text{mil}^{-1}.\text{cm}^{-2}.$ 24 h^{-1} to permeate, provided films were free from imperfections. Examination by scanning electron microscopy verified that many films were imperfect, especially those thinner than 0.2 mil. When films were embedded in chocolate and evaluated by a sensory panel, the 0.2 mil film was detectable, but only slightly objectionable. AS

Starch

788

Ranhotra (GS), Gelroth (JA), Astroth (K) and Eisenbraun (GJ). **Effect of resistant starch in intestinal responses in rats.** *Cereal Chemistry* 68(2): 1991: 130-132

Native starch (NS) extracted from wheat and subjected to five autoclaving and cooling cycles contained 11.5% resistant starch (RS), which was measured as insoluble fiber; NS contained a mere 0.5% RS. Both starches were fed to groups of rats for 4 wks (RS was fed with or without antibiotics). Compared with rats fed NS, those fed treated starch showed a sixfold (RS diet) or nearly 18-fold (RS with antibiotics) increase in fecal wet wt.; increases in fecal vol. paralleled increased in fecal wt. Rats fed treated starch (no antibiotics) digested 37.1% RS; those fed antibiotics digested only 14.3% RS. RS thus appears to be highly resistant to mammalian enzyme and may be classified as a component of fiber. AS

789

Lii (C-Y) and Chang (Y-H). **Study of starch in Taiwan.** *Food Reviews International* 7(2): 1991: 185-203

Review. 35 references. SRA

Sugars

790

Anon. **Premium-quality polydextrose improves lower-calorie foods.** *Food Technology* 45(5): 1991: 102-103

This report gives an outline of "litesse" a premium-quality polydextrose bulking and fat-sparing agent. Its application, production, composition, characteristics, functional properties (caloric value, freezing-point depressant, bland taste, viscosity, humectancy, water activity), regulatory status and labelling are discussed. CSA

Poncini (L). **Preliminary thermal degradation studies of pure and raw sucrose in the solid and molten phases - a means of producing industrial useful chemicals.** *Indian Sugar* 40(11); 1991; 811-815

The efficacy of degradation, determined as the percentage conversion of sucrose to glucose, time of heating and yield of anhydrofructose were estimated for both raw sugar solid and melt regimes and compared with pure sucrose under identical conditions. Results of the trials indicated that pure sugar when heated with increase in time and temp. yielded only 0.1% fructose, whereas the percentage conversion of sucrose to glucose at 180 C was nearly 3 times as great as that at 170 C. Further heating at higher temp. beyond 15 and 20 min resulted in caramelization of sugar. There was no caramelization at 170 C of heating, when heated for 75 min. Raw sugar at 170 C gave an optimum anhydrofructose yield (1.6%) after 50 min heating. Impurities in the raw sugar tend to lower the crystal decomposition temp. hence, for the same time of heating more raw sugar is converted glucose than pure sugar. The results for sugar melt study involving pure sucrose showed that shorter duration is needed, compared with the solid study, for optimizing the anhydrofructose yield. From an industrial point of view the utilization of a sugar melt regime appears more favourable than a solid sugar system in terms of efficiency. A GLC investigation of the distillate obtained from a raw sugar melt, heated at 180 C for 37 min gave an optimum anhydrofructose yield of 29%, glucose 15.6%. The sucrose to glucose conversion based on peak area was 6.8%. SRA

BAKERY PRODUCTS

792

Rama (MB). **Functions of ingredients in the manufacture of bakery products.** *Indian Baker* 22(1); 1991; 21-24

Functions of ingredients, wheat flour and other flours, salt, yeast, water, sugar, egg, milk, leavening agents, flavour, surfactants, enzymatic supplements, yeast food, oxidising agents and antimicrobial additives, in the manufacture of bakery products bread in particular are detailed. SD

793

Chandra Shekar (S). **Selection of flours for bakery products.** *Indian Baker* 22(2); 1991; 13-15

About 90 - 92% wheat crop is *Triticum aestivum* suitable for bakery products, hard var. for bread and soft var. for biscuit and cake. In the absence of proper gradation of these var., moisture of flour should not exceed 14%; satisfactory colour determined by Pekan test, particle size (fine for biscuits, cakes and not fine for bread), about 0.5% total ash content, proper crude protein content (cake 8%, biscuit 9%, crackers 10%, bread 11%) and gluten quality (disintegration time of yeasted dough not exceeding 30 min for soft wheat, 200 min or more for hard wheat). SD

Bread

794

Krishna Kumar (P) and Phoolka (MK). **Requirements of quality raw materials for bakery industry "bread".** *Indian Baker* 21(1); 1990; 11-18

The quality parameters and their specific requirement like moisture content, colour, granularity, protein/gluten content, water absorption power, ash content, damaged starch content, diastatic activity including maltose figure, amylograph, falling number, rheological standards, Brabender farinograph, absorption, peak time, stability time, mixing tolerance index, Brabender extensograph, rope spore count, uric acid test in bread making are reviewed and the optimum requirement of these are indicated. SRA

795

Rama (MB). **Processing stages of breadmaking.** *Indian Baker* 22(1); 1991; 25-29

Different stages of breadmaking process, sieving of flour, preparation of solutions (yeast, sugar, salt, minor ingredients, water), mixing of dough, mixing time and temp., fermentation, knock back of dough, dough make up (scaling, rounding, intermediate proof, moulding, curling, sealing), panning, final proof and baking are clearly detailed including all the physical changes at different stages. SD

796

Vijay Kaul. **Faults in bread. Causes and corrective measures.** *Indian Baker* 22(2); 1991; 16-19

The author has listed causes and corrective measures for faults in bread viz., lack of vol. and crust colour; poor shape; coarse texture; crumbly bread; holes, streaks and cores in bread; poor crumb colour and defects of aroma and taste. SD

797

Balakrishnan (N). **Role of high speed mixer in breadmaking.** *Indian Baker* 22(2); 1991; 21-23

Listing exhaustively the merits and demerits of slow speed and high speed mixers, the author recommends the latter for uniform bread quality between batches. SD

798

Amr (AS). **Characterization and use of samah in the production of flat bread.** *Cereal Chemistry* 68(2): 1991: 155-159

Samah (*Mesembryanthemum forsskalii*) seeds were characterized in respect to their test wt. and 1,000-kernel wt. Analysis revealed that their meal is nonglutinous and contains starch, about 20.50% protein, 5.20% fat, 4.25% ash, and 1.98% fiber (db). Compared with cereal grains, it is rich in iron but low in calcium. Amino acid analysis proved that the protein of samah seeds is high in glutamic acid, arginine, and methionine but limited in leucine and lysine. Amylograph and falling number tests showed that samah meal forms a soft gel at 74 C; mild roasting resulted in increased paste viscosity after holding at 95 C for 15 min and after cooling to 50 C. The brownish bland-tasting meal was used to produce flat bread by blending it with wheat flour at levels of 5, 10, 15 and 20%. The bread obtained from combinations containing up to 10% meal was acceptable. Higher levels resulted in soggy, dull and disintegrating loaves of bread. AS

799

Yaseen (AAE), El-Din (MHAS) and El-Latif (ARA). **Fortification of balady bread with tomato seed meal.** *Cereal Chemistry* 68(2): 1991: 159-161

Tomato seed meal prepared from tomato processing wastes was used as a protein source in the preparation of Egyptian balady bread. Whole and defatted tomato seed meal was added at 5, 10 and 15% wheat flour replacement levels. The influence of this addition on the rheological gas production of the dough, as well as on the organoleptic and chemical properties of balady bread, was studied. High amounts of fat and protein in whole tomato seed meal were found. Water absorption, dough development time, and dough stability were improved by increasing the level of supplementation. Defatted tomato seed meal decreased the mixing tolerance and the dough weakening, compared with those of whole meal. Extensigraph results indicated that dough extensibility, resistance to extension, and dough energy were minimized with increasing tomato seed meal in the formula containing wheat flour. Adding tomato seed meal improved gas production, moisture content, and the diameter of the loaf after baking. Organoleptic evaluation showed that

balady bread with less than 10% tomato seed meal received a fancy grade, but more than this resulted in crust and crumb darkening. AS

800

Vanhamel (S), Van Den Ende (L), Darius (PL) and Delcour (JA). **A volumeter for breads prepared from 10 grams of flour.** *Cereal Chemistry* 68(2): 1991: 170-172

A displacement volumeter is described for bread loaves prepared from 10 g of flour. Standard deviations of loaf vol. measurements by the instrument were significantly lower than those by a procedure published earlier. Other advantages of the new apparatus are that it is a closed system and that vol. readings take significantly less time than with the method previously described. With the new volumeter and glass beads of 2 mm diameter, three independent readings gave a reasonable power to discriminate between items that differ in vol. by at least 1 cm³. AS

801

Sahi (SS) and Sonecha (KD). **Formation and stabilisation of gas cell walls in bread doughs.** *Flour Milling and Baking Research Association Bulletin* (4): 1991: 105-120

This report describes the work carried on dough liquor extracts using surface chemical methods and biochemical analysis. Results indicate that the poor bread making flour produced a greater reduction in the surface tension of the water than good bread making flour. Surface elasticity and viscosity measurements of the interfacial films showed that the good bread making flours on the whole tended to produce strong viscoelastic films whereas poor bread making flour formed only weak films. There is a relationship between the rheological properties of interfacial films and bread making performance. Surface tension and surface elasticity and viscosity appear to be influenced by levels of lipids: higher lipid levels reducing the surface tension of water to greater extent and moderating the mechanical strength of the internal films. Lower lipid levels produce less reduction in surface tension and generally favour formation of mechanically stronger surface films. The type and quality of protein material also appears to be important in producing strongly viscoelastic films. SRA

802

Luning (PA), Roozen (JP), Moest (RAFJ) and Posthumus (MA). **Volatile composition of white bread using enzyme active soy flour as improver.** *Food Chemistry* 41(1): 1991: 81-91

The volatile comp. of bread isolated by dynamic headspace technique, analysed by GC and identified by combined GC/MS showed that addition of enzyme active soy flour increased the concn. of hexanal, 1-hexanol, 1-penten-3-ol, 1-pentanol and 2-heptanone while 2-heptenal and 1-octen-3-ol have only been detected in bread containing soy flour. SD

Pasta

803

Cole (ME), Johnson (DE), Cole (RW) and Stone (MB). **Colour of pregelatinized pasta as influenced by wheat type and selected additives.** *Journal of Food Science* 56(2): 1991; 488-493

Wheat type strongly influenced instrumental colour values of pregelatinized pasta. Formulation of pasta with 1.0% disodium phosphate increased saturation index of dry pasta while addition of 5.0% wheat gluten increased lightness index of rehydrated pasta. Raising levels of glyceryl monostearate from 0.75 to 2.0% increased lightness of dry and rehydrated products. SRA

MILK AND DAIRY PRODUCTS

804

Hughes (DB) and Hoover (DG). **Bifidobacteria. Their potential for use in American dairy products.** *Food Technology* 45(4): 1991; 74, 76, 78-80, 83

This article discusses on bifidobacteria, focussing specifically on classification, recent research on these organisms, and possible therapeutic benefits obtained from ingestion of bifid-containing foods such as maintenance of normal intestinal microflora balance, improvement of lactose-tolerance of milk products, anti-tumorigenic activity, reduction of serum cholesterol levels and synthesis of B-complex vitamins. This article also presents a perspective on the international market of bifid-containing dairy products and summarizes the market potential these products have in the United States. CSA

805

Kim (SM) and Zayas (JF). **Comparative quality characteristics of chymosin extracts obtained by ultrasound treatment.** *Journal of Food Science* 56(2): 1991; 406-410

Chymosin extracts obtained by ultrasound treatment were darker, less green, less blue and more turbid than controls. Ultrasound treatment

did not affect activation energies for proteolytic activity, total viable cell counts or storage stability of chymosin extracts. BV

Milk

806

Duncan (SE), Christen (GL) and Penfield (MP). **Rancid flavour of milk: relationship of acid degree value, free fatty acids, and sensory perception.** *Journal of Food Science* 56(2): 1991; 394-397

This investigation indicated that the correlation between acid degree value (ADV) and rancidity score was 0.13 ($P = 0.16$). Lab.-prepared rancid samples were assigned higher rancidity scores than farm-collected milk samples with similar ADV. Rancidity scores and ADV increased with storage time. Major free fatty acid concn. increased as ADV increased ($r = 0.93$, $P = 0.0001$) for farm milk samples but correlation was low ($r = 0.27$, $P = 0.40$) for lab.-prepared rancid samples. SRA

807

Chen (ZY) and Nawar (WW). **Role of milk fat globule membrane in autoxidation of milk fat.** *Journal of Food Science* 56(2): 1991; 398-401, 426

The influence of the milk fat globule membrane (MFGM) on oxidation of milk fat under various conditions was monitored by fatty acid analysis and oxygen consumption at 50 °C. The rate of copper-catalyzed oxidation of cream containing the membrane was faster than when the membrane was removed. In the dry state, the isolated MFGM, membrane lipids (ML) and the nonlipid membrane solids (NLMS) inhibited oxidation at 50 and 95 °C. In the presence of water, however, all membrane components enhanced oxidation at 50 °C. The balance between the accelerating effects of membrane components and the inhibiting influence of other factors appeared to depend on processing conditions. AS

808

Ustunol (Z), Hicks (CL) and Payne (FA). **Diffuse reflectance profiles of eight milk-clotting enzyme preparations.** *Journal of Food Science* 56(2): 1991; 411-415

Eight milk-clotting enzyme preparations were standardized to equal clot time and used to coagulate pasteurized whole milk. Diffuse reflectance profiles were monitored for 60-min using a fiber optic sensor sensitive to infrared light at 950 nm. Modified *Mucor melhi* and *M. pusillus* protease, recombinant chymosin and calf rennet produced

similar profiles. Rates of increase in diffuse reflectance were *Endothia parasitica* > recombinant chymosin > calf rennet > modified *M. melhel*, *M. pusillus* var. > Lindt > 50:50 blend of calf rennet and bovine pepsin > unmodified *M. melhel* > pepsin. Monitoring milk coagulation as described may be useful during cheese making and allow setting optimal conditions for milk-clotting enzyme preparations. AS

809

Jawad (MA), Dorie (J) and El Murr (N). **Electrochemical quantitative analysis of uric acid in milk.** *Journal of Food Science* 56(2): 1991: 594-595

This procedure demonstrates that electrochemical techniques are useful for direct analysis of uric acid in milk without preparative treatments and without modification of the sample. A concn. of 3.3×10^{-2} μ L milk was detectable. The method proved highly accurate, rapid and precise (coeff. of variation = 3%). SRA

810

Chen (ZY) and Nawar (WW). **The role of amino acids in the autoxidation of milk fat.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 47-50

The effect of amino acids and their analogs on milk fat oxidation were examined under various conditions by measuring oxygen consumption and total unsaturated fatty acids. All the amino acids tested acted as antioxidants, characteristically extending the induction period (IP). Not only primary amino groups are responsible for the antioxidative activities of amino acids, but also the side-chain groups contribute, at least partially, to the protective effects of L-cysteine, L-tryptophan and L-tyrosin. In aqueous and HCl solutions, the antioxidative effects of L-alanine were significantly reduced. The freeze-dried L-lysine-HCl and L-alanine-HCl accelerated, while the corresponding control amino acids inhibited, milk fat oxidation. AS

Milk products

Cheese

811

Anon. **Opportunity pops for heat-stable cheese.** *Prepared Foods* 160(2): 1991: 71

High temp. (HT) cheese contain less than 4% moisture and hence offer shelf stability. They also have lower microbial counts than fresh cheese. As

such they are suitable for all sorts of food processing such as extrusion, retort and deep-fat frying and microwave cooking. GS

Cottage cheese

812

Shellhammer (TH) and Singh (RP). **Monitoring chemical and microbial changes of cottage cheese using a full-history time-temperature indicator.** *Journal of Food Science* 56(2): 1991: 402-405, 410

Teleme cheese

813

Tzanetakis (N), Litopoulou-Tzanetaki (E) and Vafopoulou-Mastrogiannaki (A). **Effect of *Pediococcus pentosaceus* on microbiology and chemistry of Teleme cheese.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 173-176

The effect of *Pediococcus pentosaceus* on ripening changes of Teleme cheeses was studied. Log counts of total counts, yeasts, psychrotrophs and proteolytic bacteria ranged between 7.0 - 9.4, 2.9 - 4.7, 3.5 - 6.5 and 6.2 - 8.5, resp. throughout ripening. Log counts of lactic acid bacteria in experimental cheese (6.1 - 8.2) were found at higher levels than for the control (5.9 - 7.8). The pH of experimental cheese was significantly lower, while levels of nitrogen soluble at pH 4.6 (NCN), nitrogen soluble in 12% TCA (TCA-N) and nitrogen soluble in 5% phosphotungstic acid (PTA-N) were significantly higher ($P < 0.05$) than the control. Acetaldehyde levels and acid degree value were similar in both types of cheese. Experimental cheese was significantly ($P < 0.05$) preferred to the control and its maturation time was shortened by 1 month. It seems possible that aroma compounds deriving from amino acids contributed greatly to improved organoleptic characteristics of experimental cheese. AS

Wheys

Whey proteins

814

Phillips (LG), Yang (ST) and Kinsella (JE). **Neutral salt effects on stability of whey protein isolate foams.** *Journal of Food Science* 56(2): 1991: 588-589

Addition of 0.1 M Na_2SO_4 , NaCl or NaSCN reduced max. overruns of whey protein isolate (WPI) by 33%, 27% and 38%. This was attributable to an ionic effect, i.e., the ions interacted with countercharges

on the proteins thereby reducing electrostatic interactions. In contrast, at high concn. (1M), Na₂SO₄ improved foam stability by 76% compared to WPI without salt. Chloride had an intermediate effect, whereas NaSCN did not improve foam stability. Increasing Na₂SO₄ concn. (2M) improved foam stability by 127% compared to control. The relative effectiveness of salts at improving foam stability and heat stability followed the Hofmeister series (SO₄²⁻ < Cl⁻ < SCN⁻). AS

Milk proteins

Caseins

815

Konstance (RP) and Strange (ED). **Solubility and viscous properties of casein and caseinates.** *Journal of Food Science* 56(2); 1991; 556-559

This integrated study provided information for formulation or forms based on caseins and caseinates functionality. Viscosity and solubility of casein(ate)s could be altered by addition of salts, temp. and pH control. Casein(ate)s were solubilized at the isoelectric point with the use of CaCl₂ at appropriate concn. and temp. The addition of NaH₂PO₄ provided limited solubility of the normally insoluble rennet casein and was effective in viscosity enhancement of the proteins studied. SRA

MEAT AND POULTRY

816

Kapsokefalou (M) and Miller (DD). **Effects of meat and selected food components on the valence of nonheme iron during in vitro digestion.** *Journal of Food Science* 56(2); 1991; 352-355, 358

Meat

817

Mattila-Sandholm (T) and Skytta (E). **The effect of spoilage flora on the growth of food pathogens in minced meat stored at chilled temperature.** *Lebensmittel-Wissenschaft und -Technologie* 24(2); 1991; 116-120

The antibacterial activity of naturally contaminated minced meat samples against food poisoning organisms was studied. Bacterial growth was monitored by automated turbidometry in a medium prepared from minced meat. The growth of the food pathogens tested (i.e. *Staphylococcus aureus*, *Listeria monocytogenes*, *Bacillus cereus*, *Yersinia enterocolitica* and *Salmonella infantis*) was minimal

after a storage for 3 days at +6 C. Furthermore, antibacterial activity was studied in minced meat samples irradiated and thereafter inoculated with *Pseudomonas* spp., *Lactobacillus* spp., *Pedilococcus damnosus* or *Brochothrix thermosphacta* and stored at +6 C. The growth of food pathogens was inhibited by *Lactobacillus* and *Pseudomonas*. *Brochothrix* did not affect the growth of any pathogen. *Pedilococcus damnosus* inhibited the growth of salmonellas. The possible role of inhibitory substances, nutrient depletion and cell density are discussed. AS

818

Ali (MS), Fung (DYC) and Kastner (CL). **Comparison of rapid methods for isolation and enumeration of *Clostridium perfringens* in meat.** *Journal of Food Science* 56(2); 1991; 367-370

Recovery of *Cl. perfringens* (ATCC 12924, ATCC 12917, and ATCC 14809), from thioglycollate broth and ground beef samples by Fung's Double Tube (FDT) method was significantly higher ($P < 0.05$) than that by Oxyrase Enzyme (OE), Gas Pak Anaerobic System (GPAS), and Anaerobic Petri Dish (APD) methods. FDT gave better recovery (84%) in less time (8 - 10 h) at 42 C compared to the OE method (61%). FDT was also least costly. BV

819

Correia (LR), Mittal (GS) and Usborne (WR). **Selection criteria of meat emulsion fillers based on properties and cooking kinetics.** *Journal of Food Science* 56(2); 1991; 380-386

Textural and functional properties of meat emulsions with or without fillers were determined in the raw state, at product-temp. of 30, 40, 50, 60 and 70 C, and after showering. Reaction kinetics modelled the cooking process, and based on property changes during cooking, kinetics parameters were calculated. Regression models of enthalpy changes of activation for product properties were developed as a function of filler properties. Regression models of fully cooked meat emulsion properties with respect to filler properties were also developed. Filler selection was based on regression models. AS

Beef

820

Papadopoulos (LS), Miller (RK), Acuff (GR), Vanderzant (C) and Cross (HR). **Effect of sodium lactate on microbial and chemical composition of cooked beef during storage.** *Journal of Food Science* 56(2); 1991; 341-347

821

Smith (GL), Stalder (JW), Keeton (JT) and Papadopoulos (LS). **Evaluation of partially defatted chopped beef in fermented beef snack sausage.** *Journal of Food Science* 56(2): 1991: 348-351

822

Seman (DL), Decker (EA) and Crum (AD). **Factors affecting catalysis of lipid oxidation by a ferritin-containing extract of beef muscle.** *Journal of Food Science* 56(2): 1991: 356-358

823

Ukhun (ME) and Izi (U). **Effects of storage on some chemical indices of beef quality.** *Food Chemistry* 41(1): 1991: 55-62

Mutton

Sheep

Lambs

824

Angelo (AJSt), Koolmaraie (M), Crippen (KL) and Crouse (J). **Acceleration of tenderization/inhibition of warmed-over flavour by calcium chloride-antioxidant infusion into lamb carcasses.** *Journal of Food Science* 56(2): 1991: 359-362

Treatment of freshly slaughtered inhibited lamb carcasses with 0.3 M calcium chloride plus with 1% sodium ascorbate or 0.25% maltol accelerated post-mortem tenderization through activation of calcium dependent proteases, lipid oxidation and retarded the warmed-over flavour development in ground cooked patties. After 2 days storage at 4 C, patties from lamb carcasses treated with antioxidants retained more desirable flavour characteristics (meaty and musty/herby) of lamb, and had less off-flavour (painty and cardboardy) intensities. SRA

Pork

825

Brewer (MS) and Harbers (CAZ). **Effect of packaging on colour and physical characteristics of ground pork in long-term frozen storage.** *Journal of Food Science* 56(2): 1991: 363-366, 370

Products

Ham

826

Gracia (C), Berdague (JJ), Antequera (T), Lopez-Bote (C), Cordoba (JJ), Ventanas (J). **Volatile components of dry cured Iberian ham.** *Food Chemistry* 41(1): 1991: 23-32

Poultry

Chickens

827

Lescano (G), Narvaiz (P), Kairiyama (E) and Kaupert (N). **Effect of chicken breast irradiation on microbiological, chemical and organoleptic quality.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 130-134

High quality chicken half breasts, packed in polystyrene trays wrapped with PVC film, were irradiated in a Cobalt-60 facility with doses of 2.5, 3.0, 3.8 and 4.5 kGy, at 0 C. Storage was at 2 plus or minus 1 C. Microbiological, chemical and organoleptic analyses were performed. On samples irradiated with 2.5 kGy, the aerobic bacteria counts were reduced by about two log cycles, reaching the level of 10^6 CFU/g near day 19 post slaughter. *Escherichia coli*, enterococci, and presumptive *Salmonella* were undetected in irradiated samples. Rancidity, free fatty acids release, and water-holding capacity (WHC) were reduced in the 2.5 kGy samples. Higher radiation doses enhanced this effect on rancidity and WHC, immediately after irradiation. The sensory panel considered samples treated with 2.5 kGy organoleptically good up to day 22. Chicken samples irradiated with higher doses were also considered good up to that day, although flavour and general acceptability were lower. AS

828

Katta (SR), Rao (DR), Sunki (GR) and Chawan (CB). **Effect of γ -irradiation of whole chicken carcasses on bacterial loads and fatty acids.** *Journal of Food Science* 56(2): 1991: 371-372

Bacterial loads on broiler chicken carcasses can be eliminated by more than 99% using γ -irradiation (cobalt-60) at doses ranging from 1.5 to 2.0 kGy under commercial conditions without affecting sensory and nutritional values. Fatty acids were not affected except for palmitic which showed a decrease and oleic acid which showed an increase. BV

Broilers

829

Sams (AR), Birkhold (SG) and Mills (KA). **Fragmentation and tenderness in breast muscle**

from broiler carcasses treated with electrical stimulation and high-temperature conditioning. *Poultry Science* 70(6): 1991: 1430-1433

In each of four replications, broiler carcasses were treated with electrical stimulation (ES) (100 V, 1 A, 1 s on and 1 s off, 14 min) and high-temp. conditioning (HTC) in a 39 C water bath or conventionally processed and chilled. After harvesting at 1 h post-mortem, *Pectoralis* fillets were aged 23 h more and evaluated for cooked meat shear value. *Pectoralis* samples also were collected at 1 h post-mortem, aged for 0 or 23 h more, and analyzed for gravimetric fragmentation index using room air or an oven for drying the residue-laden screens. The results suggested that the ES and HTC treatments prevented myofibrillar fragmentation that occurred in the control carcasses. Also, although fragmentation index and shear value were correlated within the combined ES and HTC treatments, these two parameters were not correlated when the data from all treatment combination were combined. Oven drying improved both the ability of the fragmentation index measurement to resolve differences between treatment means and to evaluate the correlation between this parameter and shear value. Sample aging time was observed to have little effect on the relative differences between treatment means but improved the correlation between fragmentation index and shear value. AS

830

Izat (AL), Yamaguchi (W), Kaniawati (S), McGinnis (JP), Raymond (SG), Hierholzer (RE), Kopek (JM), Mauromoustakos (A). **Use of consecutive carcass rinses and a most probable number procedure and estimate salmonellae contamination of inoculated broilers.** *Poultry Science* 70(6): 1991: 1448-1451

Turkeys

831

Bater (B) and Maurer (AJ). **Effects of fat source and final comminution temperature on fat particle dispersion, emulsion stability and textural characteristics of turkey frankfurters.** *Poultry Science* 70(6): 1991: 1424-1429

Turkey frankfurter emulsions containing turkey thigh meat and 18% turkey fat, pork fat or beef fat were chopped to final comminution temp. of 13, 18 or 23 C and heat processed. Data were obtained on fat particle distribution, fat separation, emulsion stability, shear press value, and proximate analysis to determine an optimum final comminution temp. for turkey frankfurters. At the same final comminution temp., particle size for turkey fat was smallest, pork fat was intermediate, and beef fat was

largest. The optimum emulsion stability for different types of fat was dependent on final comminution temp. For turkey fat and pork fat, the optimum final comminution temp. among those compared was 13 C, and the optimum final comminution temp. for beef fat was 18 C. No significantly different shear press values were obtained among the frankfurters. AS

832

Hsieh (F), Peng (IC), Clarke (AD), Mulvaney (SJ) and Huff (HE). **Restructuring of mechanically deboned turkey by extrusion processing using cereal flours as the binder.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 139-144

Mechanically deboned turkey (MDT) was extruded with yellow or white corn flour using a twin-screw extruder. The extruder percent torque and specific energy were higher and the extrudates were harder for MDT when white corn flour was added than was the case with added yellow corn flour or rice flour. Die pressure, extrudate thickness and thiobarbituric acid values were not affected by flour type. Lower extrusion temp. produced extrudates that were thinner, softer, darker, less red and less yellow, and resulted in higher extruder percent torque, specific energy and die pressure. The critical role of cereal flours as the binder in restructuring MDT using twin-screw extrusion technology was indicated. AS

833

Genigeorgis (CA), Meng (J) and Baker (DA). **Behavior of nonproteolytic *Clostridium botulinum* type B and E spores in cooked turkey and modelling lag phase and probability of toxigenesis.** *Journal of Food Science* 56(2): 1991: 373-379

A spore pool inoculum (I) of 4 each type B and E nonproteolytic *Cl. botulinum* was applied at levels of $\log_{10}$ -2 to 4 spores per 2-3 g sample of cooked turkey (0, 1.47 and 2.2% brine (B), resp.), stored under vacuum at 4, 8, 12, 16, 20 and 30 C up to 180 days. Earliest toxin production at the above temp. (T) was detected in 0% brine meat after > 180, 8, 4, 1.5, 1.5 and 0.5 days, in the 1.47% brine after 70, 8, 7, 2, 1.5 and 1 days, and in the 2.2% brine after 130, 10, 9, 2.5, 1.5 and 1 days, resp. Lag phase (LP) was affected significantly by T, I, and $T \times I$ ($p < 0.001$) but not B ($0.05 < p < 0.1$). The derived model predictive of LP was: $\log_{10}LP = 0.625 + 6.710 (1/T) + 0.0005 (I) \times (T) - 0.033 (T) + 0.102 (B) - 0.102 (I)$ with $R^2 = 0.970$. More precise sampling plans and augmentation of our dataset will increase confidence in the model. AS

Products

Eggs

834

Matiella (JE) and Hsieh (TC-Y). **Volatile compounds in scrambled eggs.** *Journal of Food Science* 56(2): 1991: 387-390, 426

Scrambled eggs prepared from fresh farm eggs stored in polystyrene cartons for 0 - 2 wk and supermarket eggs packaged in polystyrene cartons were analyzed for volatile compounds by dynamic headspace sampling. High compounds (aldehydes, ketones, alcohols, furans, esters, benzene derivatives (including styrene), alkanes, sulphur-containing compounds and terpene) were identified. Aldehydes were the most abundant volatile compounds in the egg samples. Volatile styrene monomer increased in scrambled egg samples during 2 wk storage of shell eggs in polystyrene containers. Scrambled eggs prepared from supermarket shell eggs contained 7 times more ethylbenzene and styrene than those prepared from fresh farm eggs stored in polystyrene containers for 2 wk. SRA

835

Shah (DB), Bradshaw (JG) and Peeler (JT). **Thermal resistance of egg-associated epidemic strains of *Salmonella enteritidis*.** *Journal of Food Science* 56(2): 1991: 391-393

SEAFOODS

836

Grodner (RM), Andrews (LS) and Martin (RE). **Chemical composition of seafood breeding and batter mixes.** *Cereal Chemistry* 68(2): 1991: 162-164

Twenty-four seafood breeding and batter mixes were analyzed by proximate analysis to establish value-added protein guidelines for use in food service and school lunch programs. Protein levels were similar for breeding samples; values ranged from 9.10 to 12.80%. All batter mixes except one contained less protein than the breadings, ranging from 2.90 to 15.75%. Fat content varied from 0.20 to 5.30% and moisture content from 8.30 to 11.35%. Carbohydrate values for all breadings and batters ranged from 70 to 79%; crude fiber averaged 0.3%, and ash ranged from 1.00 - 8.05%. Specific amino acid contents were similar for all breeding and batter mixes. Chemical scores determined that lysine was the primary limiting amino acid in 16 breeding and batter samples and the second limiting amino acid

in four samples. These scores were used to compare amino acid contents of various proteins with the reference pattern of the Food and Agriculture Organization, meeting the requirements of young children. Total sulphur-containing amino acids were limiting in 6 samples, and valine and isoleucine were the limiting amino acid in one sample each. AS

Crabs

837

Buchanan (RL). **Microbiological criteria for cooked, ready-to-eat shrimp and crabmeat.** *Food Technology* 45(4): 1991: 157-160

The rationale underlying the microbiological criteria to assess the presence of specific pathogens (*Salmonella*, *Staphylococcus aureus*, *Vibrio*, thermal tolerant coliforms and *Listeria monocytogenes*) and maintenance of process integrity with regard to cooked ready-to-eat shrimp and crabmeat is summarized. CSA

Lobsters

838

Yan (X) and Taylor (KDA). **Studies on the mechanism of phenolase activation in Norway lobster (*Nephrops norvegicus*).** *Food Chemistry* 41(1): 1991: 11-21

Shrimps

839

Jiang (S-T), Moody (MW) and Chen (H-C). **Purification and characterization of proteases from digestive tract of grass shrimp (*Penaeus monodon*).** *Journal of Food Science* 56(2): 1991: 322-326

Proteases in grass shrimp (*Penaeus monodon*) digestive tract were extracted. Four fractions, A, B, C and D, demonstrated caseinolytic activity and were purified to electrophoretic homogeneity. A, C and D were trypsin-like, while B was a chymotrypsin-like protease. Optimal temp. for proteases A, B and C were 65 C, and that for D was 55 C for hydrolysis of casein. Optimal pH of proteases A and C was 8.0, and that of D was 7.0 for hydrolysis of p-toluenesulfonyl-L-arginine methyl ester. Optimal pH of protease B for hydrolysis of N-benzoyl-L-tyrosine ethyl ester was 8.0. Inactivation of 50% enzyme activity in 5 min occurred at 67 C for protease B and 50 C for protease A, C and D. AS

Mandeville (S), Yaylayan (V), Simpson (B) and Ramaswamy (H). **Isolation and identification of carotenoid pigments, lipids and flavour active components from raw commercial shrimp waste.** *Food Biotechnology* 5(2): 1991: 185-195

Squids

841

Rahman (SMd) and Potluri (PL). **Thermal conductivity of fresh and dried squid meat by line source thermal conductivity probe.** *Journal of Food Science* 56(2): 1991: 582-583

Thermal conductivity (TC) of fresh and dried squid mantle meat determined using a line source probe method varied from 0.52 to 0.04 w/m C at 30 C. TC decreased with decreasing moisture. TC data correlated with moisture content by an exponential form equation. AS

Clams

842

Tanchotikul (U) and Hsieh (TC-Y). **Analysis of volatile flavour components in steamed rangia clam by dynamic headspace sampling and simultaneous distillation and extraction.** *Journal of Food Science* 56(2): 1991: 327-331

The volatile flavour components of steamed rangia clam (*Rangia cuneata*) were extracted by dynamic headspace sampling (DHS) and simultaneous distillation/extraction (SDE) techniques, and analyzed by gas chromatography/mass spectrometry (GC/MS) and GC-coupled aroma perception. Twenty-two heterocyclic aroma compounds were identified. Volatile flavour compounds in other chemical classes, such as aldehydes, alcohols, ketones and terpenes also were identified. The unique clam aromas were contributed by a combination of S-, and N-containing compounds and ketones. In general, sampling methods (DHS and SDE) complemented each other in compounds detected in the sample. However, SDE gave more information on characteristic steamed clam flavours. AS

Fish

843

Eld (N), Dashti (B) and Sawaya (W). **Sub-tropical fish by-catch for surimi processing.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 103-108

Six fish species (catfish, goatfish, lizard, ponyfish, therapon and trevally) were manually processed into fish mince and surimi by using three washing steps (1:3 meat-to-water ratio). Soluble protein and total solids leached out during washing were determined and the colour and texture of surimi gels were tested. Washing caused efficient removal of soluble protein, which accounts for 41-58% of total solids leached out. The colour of washed mince was also improved. The texture parameters (stress, true strain and rigidity) of surimi gel prepared from lizardfish, catfish, goatfish and therapon were markedly enhanced by gel setting at 40 C for 30 min or 4 C for 24 h. Incubation at 60 C for 30 min led to soft gels. Lizardfish would be ideal for surimi in terms of texture and colour. The other three fish sp. did not produce very light surimi, but showed reasonable elastic gel properties. AS

844

Beas (VE), Wagner (JR), Anon (MC) and Crupkin (M). **Thermal denaturation in fish muscle protein during gelling: Effect of spawning condition.** *Journal of Food Science* 56(2): 1991: 281-284

Thermal denaturation of myofibrillar proteins from pre- and post-spawning hake by differential scanning calorimetry (DSC), and evaluation of denaturation kinetics under both conditions is dealt in this article. The denaturation enthalpies of all pre-spawning fish muscle extracts were less than those from post-spawning. The area under the DSC thermogram corresponding to myosin denaturation was smaller in myofibrillar extracts from pre-spawning than from post-spawning hake, while the areas corresponding to denaturation of actin were similar. Between 40 and 55 C the myosin denaturation rates were greater for post-spawning than for pre-spawning hake. Both enthalpies and kinetic data indicated proteins of fish in a better biological condition (post-spawned) denature more rapidly and completely. AS

845

Yoon (KS), Lee (CM) and Hufnagel (LA). **Effect of washing on the texture and microstructure of frozen fish mince.** *Journal of Food Science* 56(2): 1991: 294-298

Textural hardening of fish mince during storage was investigated by examining texture and structure of unwashed and washed fish mince. Washing reduced TMAO and increased water-binding ability, but did not prevent development of hard, rubbery texture in fish mince during frozen storage. Transmission electron microscopy showed more shrinkage of myofibrillar units (sarcomeres) occurred in washed than unwashed mince. Textural hardening of washed mince was thus

related to increased freeze-induced contraction of myofibrils. Removal of water-soluble sarcoplasmic proteins facilitated freeze-induced contraction of myofibrils, leading to textural hardening. This suggested that water soluble proteins retard sarcomere shrinkage resulting from freeze-induced contraction/protein cross-linking. AS

846

Rebeca (BD), Pena-Vera (MT) and Diaz-Castaneda (M). **Production of fish protein hydrolysates with bacterial proteases: yield and nutritional value.** *Journal of Food Science* 56(2); 1991: 309-314

This study was conducted to observe the effect of three bacterial proteases under different hydrolysis conditions on yield of soluble fish protein. The nutritional value of fish protein hydrolysates obtained was evaluated in a study with rats. Results showed that protein was solubilized faster with pascalase 560 than with HT-200 or protease N. 80 to 85% nitrogen was recovered after 2 h hydrolysis with pascalase 560 or 3 h with HT-200 and protease N. The recovery of soluble nitrogen improved with increase in protease concn. following a quadratic trend. Yields of 13 to 15% in terms of whole fish were obtained at the pilot plant. Products contained 83 to 86% protein of which 70 to 80% was soluble. Reactive lysine was 70 to 85%. Body wt. gain, feed efficiency, PER and NPR were reduced by inclusion of fish protein hydrolysates in diets. The nutritional value of hydrolysates was 10 to 15% lower than that of casein. Results suggest that fish protein hydrolysates can be used in the food industry for their solubility and nutritional value. SRA

847

Kelleher (SD) and Hultin (HO). **Lithium chlorides as a preferred extractant of fish muscle protein.** *Journal of Food Science* 56(2); 1991: 315-317

Lithium chloride yielded better extraction of fish muscle protein than sodium or potassium chloride under most conditions. In addition, constancy of extracted protein was better with lithium compared to potassium or sodium chlorides with respect to blending time, salt concn., pH, temp. and foaming. With stored red hake muscle, LiCl was superior to NaCl with better extractability of protein and more linear reduction of extractability with storage time. Evidence indicated the superior performance of lithium compared to sodium was due to stabilization by lithium chloride of fish proteins towards denaturation. AS

848

Alur (MD), Venugopal (V), Nerkar (DP) and Nair (PM). **Bacterial spoilage profiles to identify irradiated fish.** *Journal of Food Science* 56(2); 1991: 332-334, 351

Bacterial growth (*Aeromonas hydrophilla*, *Salmonella typhimurium*, *Bacillus megaterium* and *Pseudomonas marinoglutinosa*) and accompanying formation of volatile basic nitrogen compounds in membrane - sterilized soluble protein fraction of Indian mackerel was examined, and influence of irradiation of shrimps at varying doses ranging from 0 to 5 kGy on the spoilage of shellfish has been studied. Results showed that bacteria profile rated well in unirradiated and irradiated fish, but formation of volatile acid and volatile base were lower in irradiated than unirradiated counterparts. Total volatile acids and total volatile basic nitrogen produced by the organisms or mixed flora from fish were only 30 - 50% those of controls. A method for identifying radiation - processed fish could evolve based on lower susceptibility of irradiated fish to bacterial spoilage. SRA

849

Luong (JHT), Male (KB) and Huynh (MD). **Applications of polarography for assessment of fish freshness.** *Journal of Food Science* 56(2); 1991: 335-337, 340

Fish freshness was assessed with an enzymatic method using a polarographic probe at 0.7 volt (platinum vs silver) to monitor degradation of inosine monophosphate (IMP), inosine (H x R), and hypoxanthine (Hx). The K-value, a ratio of $H \times R + Hx / IMP + H \times R + Hx$, was determined in Sockeye salmon, Pacific cod and Pacific herring in ice and at 12 C. Results were compared with those from HPLC and sensory scores. K-values by polarography correlated well with HPLC. Loss of freshness accompanied rise in K-value in all studies. Sensory scores correlated relatively well with K-values in Sockeye salmon and Pacific herring but less with Pacific cod. K-value did not reflect eating quality of Pacific cod. AS

850

Ko (W-C), Tanaka (M), Nagashima (Y), Taguchi (T) and Amano (K). **Effect of pressure treatment on actomyosin ATPases from flying fish and sardine muscles.** *Journal of Food Science* 56(2); 1991: 338-340

The effect of pressure treatment (1 atm. - 5000 atm.) on flying fish and sardine actomyosin ATPases was studied from the standpoint of interaction between myosin and actin. The activities of actomyosin Mg-ATPases markedly decreased and those of the EDTA-ATPases rapidly increased with prolonged

pressure treatment at 300 atm. and 5000 atm. Changes in activities of F-actin plus pressure-treated myosin Ca-ATPases showed results similar to those of pressure-treated actomyosin Ca-ATPases, while myosin plus pressure-treated F-actin resulted in decreased Mg-ATPase activity and increased EDTA-ATPase activity. AS

851

Miyazawa (T), Kikuchi (M), Fujimoto (K), Endo (Y), Cho (S-Y), Usuki (R), Kaneda (T). **Shelf-life dating of fish meats in terms of oxidative rancidity as measured by chemiluminescence.** *Journal of the American Oil Chemist's Society* 68(1); 1991; 39-43

A versatile and speedy chemiluminescence method for predicting shelf life of 6 sp. fish sardine, red sea bream, tuna, kichiji, mackerel meats is discussed. The chemiluminescence intensity of fresh fish meats increased in proportion to the measuring temp. and differed significantly among fish meats. The shelf-life of fish meats was estimated based on oxidative deterioration as measured by peroxide (PV), carbonyl and thiobarbituric acid values, as well as sensory evaluation during storage of the fish meats at 0 C. The shelf-life of minced fish meats as judged by oxidative deterioration significantly correlated with chemiluminescence intensity of the fresh meats. This method can also be applied for the prediction of shelf-life of other products such as cereals, fried snack foods, fresh meat, frozen meat, seafood, coffee, tea etc. BV

Albacore

852

Price (RJ), Melvin (EF) and Bell (JW). **Postmortem changes in chilled round, bled and dressed albacore.** *Journal of Food Science* 56(2); 1991; 318-321

Albacore were killed by brain destruction, dressed, bled or left round, chilled in sea water/ice slurry at 1.1 C, and stored in ice. Fish were analyzed for 33 days for aerobic plate count (APC), pH, salt, histamine, trimethylamine nitrogen (TMA-N), and nucleotide content. Dressed albacore cooled faster than round or bled albacore. No significant differences were evident in APC, pH, salt, TMA-N, or nucleotide content of round, bled and dressed albacore. Histamine was detected only at day 33. TMA-N, inosine monophosphate and hypoxanthin content, and nucleotide ratios appeared to be useful indices of storage life. AS

Antarctic fish

853

Manthey (M), Oehlenschlaeger (J) and Rehbein (H). **Keeping quality and shelf-life of frozen stored battered and unbattered portions cut from fillet blocks of Antarctic fish.** *International Journal of Refrigeration* 14(1); 1991; 58-64

Products

Fish

854

Steele (FM), Huber (CS), Orme (LE) and Pike (OA). **Textural qualities of turkey frankfurters incorporating fish- and turkey-based surimi.** *Poultry Science* 70(6); 1991; 1434-1437

Experimental turkey-based surimi and fish-based surimi were separately incorporated into a formulation for turkey frankfurters at levels of 0, 2.5, 5 and 10%. Frankfurters containing 10% turkey-based surimi or 10% fish-based surimi were significantly lower ($P < 0.05$) than the control in fat and higher in expressible moisture and resistance to shear. No difference existed between treatments and control in moisture, protein, cooked yield, or resistance to puncture. The microstructure of the protein matrix, examined with scanning electron microscopy at 400x, was compact in frankfurters containing fish-based surimi. Incorporation of turkey-based surimi had no observable effect on frankfurter microstructure. AS

855

Sych (J), Lacroix (C) and Carrier (M). **Determination of optimal level of lactitol for surimi.** *Journal of Food Science* 56(2); 1991; 285-290, 298

Cryoprotective effects of lactitol dihydrate at 2, 4, 6 and 8% levels in cod surimi were investigated and compared to an industrial control (1:1 mixture of sucrose/sorbitol at 8% w/w) and to a control without additive. Stability of protein functional properties was monitored by salt extractable protein and differential scanning calorimetry analyses, as well as texture profile analyses of cooked gels for surimi stored at -12 C for 8 wk. Data revealed the excellent cryoprotective properties of lactitol. Moreover, the level of lactitol in surimi could be reduced to 5.7 - 6.4% w/w without significant alteration of stabilizing effects. AS

856

Himelbloom (BH), Brown (EK) and Lee (JS). **Microbiological evaluation of Alaska shore-based surimi production.** *Journal of Food Science* 56(2); 1991; 291-293, 314

Two shore-based surimi plants in Alaska were investigated to determine microbial conditions of Alaska pollock flesh during processing. Median aerobic plate count (APC) was 2.0×10^3 /g after mincing, 2.3×10^3 /g after washing/screening, 4.2×10^4 /g after refining and 1.6×10^4 /g after dewatering. Reprocessing, needed for nonanalog grade surimi, resulted in APC of 1.2×10^5 /g after a second refining and 3.0×10^5 /g after a second dewatering. The APC for analog grade surimi was 5.5×10^4 /g and 2.0×10^6 /g for nonanalog grade surimi. Highest total coliform most probable number (MPN) of > 1100 /g was determined from a nonanalog grade surimi sample and from a mince that had been refined twice. Highest *Escherichia coli* MPN of 460/g as determined from two minces. AS

857

Himelbloom (BH), Brown (EK) and Lee (JS). **Microorganisms isolated from surimi processing operations.** *Journal of Food Science* 56(2): 1991: 299-301

Heterotrophic bacteria isolated from two shore-based surimi processing plants in Alaska were identified to the genus level. In one plant, the major bacterial constituents were *Flavobacterium* and *Pseudomonas*, followed by *Moraxella*, *Aeromonas*, *Lactobacillus*, *Serratia*, and *Acinetobacter*. In the other plant, major bacterial groups were *Flavobacterium* and *Arthrobacter/Corynebacterium*, followed by *Pseudomonas* and *Acinetobacter*. *Pseudomonas*, *Aeromonas*, and *Serratia* were capable of rapid growth as low as 8 C, with respective generation times 3.0, 3.1 and 3.6 h. Freezing and thawing of surimi reduced microbial counts to 45 - 67% of the pre-frozen load; however, the composition of the microbial flora was maintained. The plant environment was a potential source of microbial contamination. AS

858

Wang (DG) and Kolbe (E). **Thermal properties of surimi analyzed using DSC.** *Journal of Food Science* 56(2): 1991: 302-308

Thermal properties of surimi made from Alaska pollock (*Theragra chalcogramma*) were analyzed using differential scanning calorimetry (DSC) in the freezing range. Each dynamically corrected thermogram was used to determine initial freezing point, unfreezable water (bound water), apparent specific heat, enthalpy and unfrozen water wt. fraction. When water content was controlled at 80.3% (wet basis), the cryoprotectant concn. had little effect on thermal properties in the unfrozen and fully frozen (-40 C) ranges. However, the initial freezing point and thermal properties just below this

point were significantly affected. The study also demonstrated the great potential of DSC for measuring and modeling frozen food thermal properties. AS

PROTEIN FOODS

Weaning foods

859

Marero (LM), Payumo (EM), Aguinaldo (AR), Matsumoto (I) and Homma (S). **Antinutritional factors in weaning foods prepared from germinated cereals and legumes.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 177-181

The effect of germination, flour and gruel preparation on the amount of antinutritional factors in rice, corn, mungbean and cowpea, as well as in four weaning foods from 70% 72 h germinated cereals and 30% 48 h germinated legume were studied. Phytates, tannins, trypsin inhibitors, phytohemagglutinins and cyanogenic glycosides were determined. *In vitro* protein digestibility was performed, and an infant tolerance test of weaning foods was conducted. Germination, drying, dehulling, roasting and cooking significantly ($P < 0.05$) reduced antinutritional factors in the materials. Phytates and tannins in cooked gruel, ultimately, were too small to be of nutritional significance. Antitrypsin activity was almost nil in cooked gruels, while phytohemagglutinin activity was virtually eliminated. Increase in *in vitro* protein digestibility was noted from the flour form to the cooked gruel. All 4 formulations were well-tolerated by infants who showed no signs of stomach disorders, vomiting, rashes or fever throughout the 10-day feeding test. AS

860

Adewusi (SRA), Orisadare (BO) and Oke (OL). **Studies on weaning diets in Nigeria. I. Carbohydrate sources.** *Cereal Chemistry* 68(2): 1991: 165-169

Ogi is an fermented cereal porridge and a popular weaning, breakfast, and convalescent food in Nigeria. It is made from sorghum in the northern part of the country, where sorghum is cultivated abundantly, and from maize in the heavy rain belt of the south. In this study, ogi was made from white and yellow maize and from white and red sorghum and compared with other carbohydrate sources in a simulated weaning diet. The yield of ogi was 66.0 - 75.9%, and the protein content was 7.53-9.28%, compared with 8.05% for breadfruit and 1.05% for cassava starch. Reducing sugar was 2.85% in

breadfruit and 0.03-0.08% in the others. White sorghum *ogl* contained the highest energy (4.07 kcal/g) and the lowest ash (0.32%), whereas cassava starch contained the lowest energy (3.38 kcal/g) and the highest ash (3.91%). Fat content was 5.5% in maize *ogl*, 2.97% in sorghum *ogl*, and 1.92% in breadfruit. Processing grains into *ogl* reduced the tannin content by 64-100% and phytate by 72-93%. Cyanide was not detected in sorghum *ogl* or cassava starch. In the rat bioassay, feed intake was highest (78.3g) in a red sorghum *ogl*-casein diet (13% protein level) and lowest in a corn starch diet (59.4g). Wt. gain, protein efficiency ratio, and net protein ratio values were highest in the cassava diet (25.2, 2.6 and 3.9g resp.), followed by breadfruit and corn starch; the lowest values were recorded with a white sorghum *ogl* diet (wt. gain 9.5 g, protein efficiency ratio 1.0, and net protein ratio 2.2). Protein digestibility was high (93.0-97.1%) for all diets. *In vitro* starch digestibility was highest in corn starch, followed by breadfruit, and lowest in white sorghum and yellow maize *ogl*. Using a first-order kinetics equation, breadfruit had the highest initial rate of starch hydrolysis ($t_{1/2}$ for 19.4 min), followed by corn starch (26.1 min); the lowest was for white sorghum *ogl* (109.7 min). The bioassay results were therefore explained in terms of starch digestibility and gastric emptying. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

861

Stoewsand (GS), Anderson (JL) and Munson (L). **Inhibition by wine of tumorigenesis induced by ethyl carbamate (urethane) in mice.** *Food and Chemical Toxicology* 29(5): 1991: 291-295

Groups of 18 - 21 male weanling C3H were given, as drinking fluid, tap-water, 12% ethanol solution, one of two commercial white wines, or red wine, *ad lib.* for 41 wk. Ethyl carbamate was added to each of the drinking liquids at levels adjusted to provide av. daily ethyl carbamate intakes of 0, 10 or 20 mg/kg body wt. After 41 wk the cumulative survival of the mice given 20 mg ethyl carbamate/kg in water was depressed compared with the mice drinking wines or ethanol solution with this ethyl carbamate level. Both ethanol and wine treatments reduced the incidence of lung Clara-cell adenomas in mice given 10 mg ethyl carbamate/kg and reduced the frequency (number of specific tumours/number of tumour-bearing mice) of both Clara-cell adenomas in mice given 10 mg ethyl carbamate/kg and of alveolar adenomas in mice given 20 mg ethyl

carbamate/kg. Wine treatments also reduced the frequency of hepatocellular adenomas compared with those of other treatment groups, and no hepatocellular carcinomas developed in any of the groups given wine, even with the 20-mg/kg ethyl carbamate dose. The incidence of hepatocellular adenomas in the groups given 10 mg ethyl carbamate/kg was, as shown by chi-square analysis, significantly reduced by the ethanol and wine treatments. The mean wt. gains of mice on all the wine treatments were lower than those of water-treated mice and this may have been a factor in tumor inhibition; however, it is also possible that wine components other than ethanol may play a role in the inhibition of tumor development. AS

862

Correa-Gorospe (I), Polo (MC), Rodriquez-Badiola (E) and Rodriguez-Clemente (R). **Composition of tartrate precipitates in white wines used for making Spanish sparkling wine.** *Food Chemistry* 41(1): 1991: 69-79

Non-alcoholic beverages

Coffee

863

Garcia (R), Arriola (D), de Arriola (MC), de Porres (E) and Rolz (C). **Characterization of coffee pectin.** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991: 125-129

Pectin from three coffee (*C. arabica*) var., namely Bourbon, Caturra and Catimor, was extracted and purified. Its physico-chemical characteristics were determined. The coffee pectin was of low methoxyl and of relatively low av. mol. wt. It did not form gels with sucrose and acid or with Ca^{++} salts. Coffee pulp (exocarp) was richer in pectin than coffee mucilage. AS

Fruit juices

Apple juices

864

Chou (F), Wiley (RC) and Schlimme (DV). **Reverse osmosis and flavour retention in apple juice concentration.** *Journal of Food Science* 58(2): 1991: 484-487

A relatively small loss of flavour compounds (n-hexanal and ethyl-2-methyl butyrate) from feed juice into the permeate during reverse osmosis (RO) concn. of apple juice using spiral-wound TFCL HP membrane configuration was observed. The % of flavour compounds in retentate at the end of RO

concn. was low. Results indicated a substantial RO processing loss of aroma due to evaporation, thermal degradation and/or membrane "capture". In contrast, non-volatile flavour components (sugars and acids) were lost by permeation. Conc. flavour profile was altered by both processing and permeation losses. In commercial RO concn. of clarified juices, lowering juice temp. (20 C) before RO processing at max. pressure (50 bar) permitted by configuration and membrane types would provide finished concn. with relatively high flavour content at an acceptable flux. BV

Citrus juices

865

Parish (ME). **Microbiological concerns in citrus juice processing.** *Food Technology* 45(4): 1991: 128, 130, 132, 134

Aspects covered include aseptic bulk storage of single-strength chilled citrus juices; fungal spoilage and control; unpasteurized and "lightly" pasteurized products and future research needs. CSA

Orange juices

866

Rodriguez (M), Sadler (GD), Sims (CA) and Braddock (RJ). **Chemical changes during storage of an alcoholic orange juice beverage.** *Journal of Food Science* 56(2): 1991: 475-479, 493

Results of the study showed that except for loss of ascorbic acid, minimal quality changes in the beverage were observed during storage at 4 C. Significant deterioration, measured by loss of ascorbic acid, increase of browning, accumulation of furfural and loss of limonene occurred in product stored at 25 and 40 C. The beverage showed no appreciable changes in alcohol content, °Brix, pH or titratable acid, but showed various volatile aroma compounds. To develop the full market potential of this beverage, inhibition of retardation of undesirable chemical and physical transformations would best be achieved by refrigeration (4 C) and oxygen exclusion. SRA

FATS AND OILS

867

Sonnet (PE) and Gazzillo (JA). **Evaluation of lipase selectivity for hydrolysis.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 11-15

The positional selectivity of several commercial lipases was reevaluated from the point of view of synthetic utility. A 1,2-diglyceride was synthesized, and exposed to typical conditions of lipase-catalyzed hydrolysis (without the enzyme). Little, or no, acyl migration was observed. The recovery of oleic acid from several lipase-catalyzed hydrolysis of 1(3)-palmitoyl-2-oleoyl-3(1)-stearoyl glycerol (POS) reported here, therefore, must be regarded as due to the presence of the lipases themselves. This could limit the use of such catalysts in schemes requiring high selectivity for the primary positions of triglycerides. Fatty acid selectivity data of the enzymes studied also are presented. AS

868

Trani (M), Ergen (F) and Andre (G). **Lipase-catalyzed production of wax esters.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 20-22

The lipase (triglycerol acylhydrolase, E.C. 3.1.1.3) catalyzed synthesis of wax esters has been investigated via two different approaches. All studies were performed using an immobilized 1,3-specific lipase (Lipozyme from Novo Industries Montreal). The first approach involves reacting stoichiometric amounts of a fatty acid and stearyl alcohol in the presence of lipase. The medium is solvent-free, which allows for high substrate concn. (1.55 M) and use of 5% (w/w) lipozyme. In this reaction, max. wax ester synthesis was found to be dependent upon the efficient removal of the water produced by the reaction. Under optimal conditions, yields of 100% were routinely reached after only 2 h. The medium was then exclusively composed of the wax and the enzyme, no purification was required. The second method involves alcoholysis of a triglyceride, in this case triolein, with stearyl alcohol to produce 1,2-diolein, 2-monoolein and the wax ester of oleic acid. Again, no organic solvent was used. The wax ester yield was found to be directly dependent upon the alcohol concn. that was used to modulate the outcome of the reaction towards either the wax or the partial glycerides. The process was applied to the synthesis of waxes from high erucic acid rapeseed oil. AS

Fats

869

Anon. **Low-fat salad dressings demand a total systems solution.** *Prepared Foods* 160(2): 1991: 73

Instant and cook-up tapioca starches imitate the creamy, fatty texture of oils, but have min. set back or retrogradation and hence are suitable for salad

dressings. Other granular starches preserve the integrity of the starch granules, are clean flavoured and disperse easily into cold solutions. GS

870

McNeil (GP), Shimizu (S) and Yamane (T). **High-yield enzymatic glycerolysis of fats and oils.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 1-5

Several triglyceride fats and oils were reacted with glycerol using lipase as catalyst. A batch system with magnetic stirring was used without the addition of any solvents or emulsifiers. In all cases a mixture of mono-, di- and triglycerides was obtained. However, the yield of monoglyceride (MG) depended strongly on the reaction temp: at higher temp, approx. 30% MG was produced at equilibrium while at lower temp, a yield of 65 - 90% MG was obtained for most of the fats examined. The upper temp. limit below which a high MG yield could be attained was designated the critical temp. (T_c). The value of T_c depended on the fat type and was found to vary between 30 and 46 C for naturally occurring hard fats. A high MG yield could not be obtained for fully hydrogenated tallow and lard under the conditions described here. Of the 3 liquid oils examined, rapeseed oil and olive oil had a T_c of 5 C and 10 C resp. whereas a high yield of MG could not be obtained with corn oil at 5 C or greater. The max. yield of MG below T_c also depended on the fat type: the highest yields being obtained for olive oil (90%), palm stearin and milk fat (80%) and the lowest yield for palm oil (67%). In all cases a high yield of MG was accompanied by solidification of the reaction mixture. The effect of enzyme type on MG production was examined for palm oil and palm stearin and the effect of water concn. was examined for palm oil. AS

871

McNeill (GP) and Yamane (T). **Further improvements in the yield of monoglycerides during enzymatic glycerolysis of fats and oils.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 6-10

Three approaches were used in an effort to increase the yield of monoglycerides (MG) during the lipase catalyzed reaction of glycerol with triglyceride fats and oils: (i) various commercially available lipases were screened for ability to catalyze MG synthesis; (ii) mixtures of lipases were compared with single lipases; and (iii) two-step temp. programming was applied during the reaction. Of these, temp. programming was found to be the most effective. With an initial temp. of 42 C for 8 - 16 h followed by incubation at 5 C for up to 4 days, a yield of approx. 90 wt.% MG was obtained from beef tallow, palm oil and palm stearin. When the second incubation

temp. was greater than 5 C, the yield of MG was progressively lower with increasing temp. In the case of screening of newly available commercial lipase preparations, lipases from *Pseudomonas* sp. were found to be most effective, giving a yield of approx. 70 wt% MG at 42 C from tallow. Lipases from *Geotrichum candidum*, *Penicillium camembertii* (lipase G) and *Candida rugosa* were inactive. A mixture of lipases from *Penicillium camembertii* and *Humicola lanuginosa* was found to be more effective than either enzyme alone, giving a yield of approx. 70 wt% MG using beef tallow or palm oil. A mixture of *Penicillium camembertii* lipase with either *Pseudomonas fluorescens* lipase or *Mucor miehei* lipase was not more effective than *Pseudomonas fluorescens* or *Mucor miehei* lipase alone. AS

872

Kosugi (H), Kojima (T) and Kikugawa (K). **Characteristics of the thiobarbituric acid reactivity of oxidized fats and oils.** *Journal of the American Oil Chemist's Society* 68(1): 1991: 51-55

The thiobarbituric acid (TBA) reactivity of oxidized methyl linoleate, soybean oil, sesame oil, lard, chicken oil and sardine oil was characterized by using four different methods with 0.01% butylated hydroxytoluene (BHT). Optimal pH for the reactivity of most of the oxidised samples was 3-4, and that of some samples was above 5. Introduction of 2 mM t-butyl hydroperoxide (t-BuOOH) or 0.2 mM ferric ion in the reaction markedly enhanced the reactivity. Introduction of 0.2 mM ethylenediamine tetraacetic acid suppressed the reactivity. The characteristics of the TBA-reactivity of the samples were similar to those of alkadienals or alkenals. The most preferable method for the estimation of the TBA-reactive substances of the oxidized fats and oils was that using solvents at pH 3.5 with introduction of BHT, and t-BuOOH or ferric ion. AS

SPICES AND CONDIMENTS

Spices

873

Sjoberg (A-M), Manninen (M), Pinnioja (S), Honkanen (E) and Latva-Kala (K). **Irradiation of spices and its detection.** *Food Reviews International* 7(2): 1991: 233-253

This review covers spices and their irradiation (microbial contents of spices, decontamination of spices by irradiation, volatile oil components and irradiation of spices), detection methods (microbial methods, luminometric methods, viscosimetric

methods, analytical methods for the detection of changes in aroma compounds of spices). 73 references. SRA

Ginger

874

Arya (PS). **Ginger processing for profit.** *Indian Food Industry* 10(3): 1991; 34-35

Aspects covered in this article are the selection of ginger rhizomes for processing (grading, washing, trimming, peeling and keeling). The preservation of ginger using sugar syrup and brine and the different processed forms such as Indian preserved ginger (murabba), crystallized ginger, dry ginger, raw dry ginger, and liming of ginger are discussed. The quality requirement, grading of dry ginger and profitability of ginger cultivation are also dealt. CSA

Pepper

875

Shigemura (R), Gerdes (DL) and Hall (WR). **Effect of gamma processing on prepackaged black and white pepper (*Piper nigrum* L.).** *Lebensmittel-Wissenschaft und -Technologie* 24(2): 1991; 135-138

The effects of gamma processing as a means of sterilizing black and white pepper was evaluated. Quality differences between the raw untreated pepper and the irradiated pepper were assessed using standard plate count (SPC), yeast and mold counts, and coliform counts. Flavour components were quantitatively measured using volatile oil and piperine analysis. The samples were processed with dosages of 10 kGy (1.0 Mrad), 17 kGy (1.7 Mrad), and 20 kGy (2.0 Mrad). The SPC of the untreated black pepper was 8.30×10^6 org/g, and the yeast and mold count was 4.70×10^3 org/g. Untreated white pepper had a SPC of 6.90×10^6 org/g, and a yeast and mold count of 9.50×10^4 org/g. The volatile oil content of the untreated black pepper was 2.50% and the piperine content was 2.55%. The untreated white pepper contained 2.00% volatile oil and 2.63% piperine. When compared to the untreated samples, the level of irradiation did not affect the volatile oil or piperine content in the black or white pepper. There was a difference in the microbial count when the untreated pepper was compared to the irradiated pepper. A dose of 10 kGy was found to be effective in obtaining zero plate counts for total bacteria, yeast, mold and coliforms without affecting quality attributes. AS

SENSORY EVALUATION

876

Overbosch (P), Afterof (WGM) and Haring (PGM). **Flavour release in the mouth.** *Food Reviews International* 7(2): 1991; 137-184

Review. 121 references. SRA

FOOD STORAGE

877

Kachru (RP) and Dakshinamurthy (A). **Improved storage techniques prevent immense grain losses.** *Indian Farming* 41(3): 1991; 21-24

This paper reviews the available storage techniques and recommends some 'dos' and 'don'ts' as improved storage technique to further curtail Rs 5000 million worth of annual food grain loss. It is estimated that the loss of grains is 0.48 - 1.47% in metal bins, 2.39 - 4.89% in gunny bags and 3.43 - 5.34% in other local storage structures. Indian Grain Storage Institute, Hapur has developed bins made of galvanized-iron, aluminium or mild-steel sheets and Central Institute of Agricultural Engineering, Bhopal has developed low-cost coaltar drums. Silos made of metal or concrete with capacity 35 - 50 tonnes are better for preventing moisture and pests. Cereals with moisture limit 10 - 12%, pulses 10% and oilseeds 8 - 7% can store well upto 32 C temp. On pest management, ventilation control, use of ninhydrin to destroy hidden infestation, use of plant-products, carbon dioxide and biogas, cross-infestation and curative measures are discussed. Different types of storage structures, capacity, cost and Institutes where they were developed are also listed. SD

INFESTATION CONTROL AND PESTICIDES

878

Abraham (RA) and Jagannathan (D). **Impact of diet counselling on selected obese cardiovascular patients.** *Indian Journal of Nutrition and Dietetics* 26(9): 1989; 249-253

The socio-economic status of the cardio-vascular patients has been studied. Diet counselling was imparted for a period of six wks, for 15 cardio-vascular patients. The changes in height, wt., triceps skinfold thickness, blood pressure, total serum cholesterol and lipoprotein fractions were observed, before and after counselling. The changes were not statistically significant due to the short period of study. GS

Pallavi Mehta, Kalindi Nanavaty, Sandhya Phadake, Sushma Baxi and Neha Parikh. **Effect of dietary counselling on knowledge gain of middle and high income group diabetics.** *Indian Journal of Nutrition and Dietetics* 26(9): 1989: 260-266

The impact of diet counselling on knowledge gain of 60 diabetic patients belonging to middle and high income group was assessed. Results indicated that there was significant ($P < 0.05$) knowledge gain due to counselling in experimental group as compared to the control group. However, actual practices of the diabetic patients could be improved by frequent counselling, simpler instructions and regular follow up for longer duration. GS

880

Mohan (S), Palaniswamy (PT) and Balasubramanian (M). **New non-insecticidal method of insect control.** *Invention Intelligence* 25(7): 1990: 326-327

A new method of insect control using biogas has been developed. The biogas (10 l at 14 kg/cm² pressure) which mainly consists of methane and CO₂ was used to fumigate the bin stored rice weevil infested paddy and sorghum. The gas was allowed to remain for 10 days. 100% disinfection was noticed. No undesirable changes in germination or cooking quality was observed. BV

881

Zhang (D), Hendricks (DG), Mahoney (AW), Yu (Y), Thannoun (AM), Sisson (DV). **Bioavailability of total dietary iron from beef and soy protein isolate, alone or combined, in anemic and healthy rats.** *Cereal Chemistry* 68(2): 1991: 194-200

Bioavailability of iron from beef, soy protein isolate (SPI), and proportional mixtures of beef and SPI was measured in anemic and healthy weaning rats. Diets were prepared by mixing beef and SPI with dietary ingredients at beef-to-SPI iron ratios of 100:0, 75:25, 50:50, 25:75, or 0:100. A casein diet supplemented with FeSO₄ was used as the reference diet. The respective mean hemoglobin regeneration efficiency (HRE) and apparent iron absorptions were 37 and 44% for anemic rats and 42 and 37% for healthy rats when the beef-based diet was fed, and 56 and 66% for anemic rats and 42 and 53% for healthy rats when the SPI-based diet was fed. The HRE and apparent iron absorption were 71 and 72% for anemic and 44 and 60% for healthy rats fed the diet supplemented with FeSO₄. Generally, anemic rats utilized more dietary iron than healthy rats. This iron status effect was greatest in rats fed the supplemented diet, less (but significant) in rats fed the SPI diet, and not significant in rats fed the beef

diet. Beef-SPI mixtures enhanced iron bioavailability when fed to healthy rats, as indicated by a significant, positive binomial curve of the iron bioavailability values versus dietary proportions of beef and SPI iron. However, this enhancement did not occur when the beef-SPI mixtures were fed to anemic rats. The correlation coeff. between HRE and apparent iron absorption was high ($r = 0.83$) for the pooled data. AS

882

Hewedy (FM), Murphy (C) and Cremin (FM). **Effect of zinc deficiency on folate absorption in rats.** *Food Chemistry* 41(1): 1991: 93-98

Rats fed on zinc-deficient diet showed a reduction of 23% plasma zinc level, and 22% in folate level, the latter due to lack of pancreatic conjugate (54.8% reduction). SD

BIOCHEMISTRY AND NUTRITION

883

Arnold (AR), Bascetta (E) and Gunstone (FD). **Effect of sodium chloride on pro-oxidant activity of copper (II) in peroxidation of phospholipid liposomes.** *Journal of Food Science* 56(2): 1991: 571-573, 578

884

Cheng (YJ) and Brittin (HC). **Iron in food: Effect of continued use of iron cookware.** *Journal of Food Science* 56(2): 1991: 584-585

Foods cooked in iron utensils showed greater iron content than that in foods cooked in non iron utensils through continued use of the iron utensils for 50 times. Thus adjustments may be advisable in determining dietary iron intake when food is cooked in iron utensils. The migration of iron into food from utensils is of considerable benefit because enhancing factors can increase absorption of nonheme iron making it more bioavailable. SRA

TOXICOLOGY

885

Groten (JP), Sinkeldam (EJ), Muys (T), Luten (JB) and Van Bladeren (PJ). **Interaction of dietary Ca, P, Mg, Mn, Cu, Fe, Zn and Se with the accumulation and oral toxicity of cadmium in rats.** *Food and Chemical Toxicology* 29(4): 1991: 249-258

FOOD LAWS AND REGULATIONS

886

Hecht (DW). **Bovine somatotropin safety and effectiveness. An industry perspective.** *Food Technology* 45(4): 1991: 118, 123-124, 126

The author discusses aspects such as how bovine somatotropin came into being and its impact on the food industry; safety; opposition to it; regulatory and consumer perception, implications and public benefits. CSA

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814	Rehbein (H)	822
Phoolka (MK)	853	Shah (BG)
794	Reseland (J)	724
Pike (OA)	703	

Shah (DB)	854	Tufail (M)
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887

Grover (I) and Shashi Kanta. **Standardization of foods and nutrition messages for package delivery.** *Indian Journal of Nutrition and Dietetics* 28(1); 1991: 20-25

An attempt has been made to identify and standardize messages and submessages for Food and Nutrition package to disseminate at village level through field functionaries and beneficiaries. This study has identified and standardized 11 crucial messages and 27 submessages as a package to be disseminated regularly. GS

888

Dziezak (JD). **Getting savvy on sauces.** *Food Technology* 45(6); 1991: 84, 87

A brief account of different kinds of sauces such as aioli, bechamel sauce, bolognese sauce, bordelaise sauce, chutney, marinara sauce, pesto and salsa that can be used to dress up entrees and side-dish food products is covered in this article. CSA

889

Fulks (FT). **Total quality management.** *Food Technology* 45(6); 1991: 96, 98-101

This article discusses about an approach which management within any area of the food industry can use to build quality. Citrus industry-taking a serious look at quality, answering the question of 'whom' to involve in discussions on quality, implementing a total quality management policy (make total quality management a priority, eliminate barriers to effective communication, draft a mission statement), creating an environment that fosters total quality (improve the manufacturing facility, practice sound management principles, maintain an on-going awareness of plant problems, institute a system to measure results, implement effective personnel management methods, provide employee training programs) and implementation ensures customer satisfaction are dealt in this article. CSA

890

Galvin (PA). **Pasteurized salads using ingredient blend retain fresh flavour.** *Food Technology* 45(6); 1991: 110

Mayonat PS, a specially formulated blend consisting of emulsifiers, stabilizers and thickeners used to simplify the production of salad dressings for pasteurized salads are discussed. The blend is of neutral flavour and smell, contains no cholesterol

and all the ingredients are GRAS. Sealed plastic cups or foil bags are ideal packages and a shelf-life of 6 months for salads pasteurized using the blend are recommended. CSA

891

Fellenz (DC) and Moppett (FK). **Browning agent enhances visual appeal of microwaved foods.** *Food Technology* 45(6); 1991: 111

Microwave browning agent develops a rich brown colour on food surfaces during microwave heating and it enhances the visual appeal of the product which is an important aspect of eating enjoyment. Browning agent has its potential applications in grain-flour-based baked foods, meats, cheese toppings and some vegetables. CSA

892

Norback (JP) and Rattunde (MAL). **Production planning when batching is part of the manufacturing sequence.** *Journal of Food Process Engineering* 14(2); 1991: 107-123

Batching is a routine part of food production, even in many manufacturing sequences which have continuous components. Determining the correct number of batches to be produced in the face of continuous demand for final product and multiple demands on the batches from many products is a computationally complex problem. An organizational and computational scheme for tracking the impact of the batching decision is presented. The structure provides means for determining resource use patterns and for costing those patterns for a given production plan. The data necessary to drive this system are the costs, the batch formulation and yields and the other resources required by the product. The scheme is suited for electronic computation and can be rendered in a straight forward way on a microcomputer. An example illustrating how the data are organized is provided. AS

FOOD PROCESSING

Nil

FOOD PACKAGING

893

Farber (JM). **Microbiological aspects of modified-atmosphere packaging technology - a review.** *Journal of Food Protection* 54(1); 1991: 58-70

A review article discusses the great vulnerability of modified-atm. packaged (MAP) foods from a safety standpoint is that with many modified atm. containing moderate to high levels of carbon dioxide, the aerobic spoilage microorganisms are inhibited, while the growth of pathogens may be allowed or even stimulated. The emergence of new psychrotrophic pathogens such as *Listeria monocytogenes*, *Aeromonas hydrophila* and *Yersinia enterocolitica*, new safety issues have been raised. A major emphasis of this review is on the effect of MAP on the growth and survival of foodborne pathogens. 115 references. BV

FOOD ENGINEERING AND EQUIPMENT

894

Lee (JH) and Singh (RK). **Particle residence time distributions in a model horizontal scraped surface heat exchanger.** *Journal of Food Process Engineering* 14(2): 1991; 125-146

Residence times and their distribution characteristics of potato cubes with aqueous solutions of sodium carboxymethyl cellulose (CMC), simulating non-Newtonian fluid foods, in a horizontal scraped surface heat exchanger (SSHE) were investigated. Min. and max. normalized particle residence times (NPRTs) and standard deviations of mean values were not significantly affected by the particle concn. while mean NPRTs of up to 10% particle concn. were significantly lower than those of 20 - 40% particle concn. ($P < 0.05$). Mean NPRTs were significantly influenced by process parameters including concn. of carrier, viz., viscosity, mutator speed and particle size ($P < 0.001$) as well as 2-way interactions among flow rate, mutator speed and particle size ($P < 0.05$ or 0.001). Furthermore, most of the individual particle residence time distributions in a horizontal SSHE flow could be described by either normal or γ distribution models. AS

895

Mihori (T), Watanabe (H) and Kaneko (S). **A control system for achieving correct heat sterilisation process. A one-dimensional approach to packaged conduction heating of foods.** *Journal of Food Processing Preservation* 15(2): 1991; 135-155

A procedure for on-line control system to achieve the correct heat sterilisation for conduction heating of food, consists of collection of series of time/temp. data to predict its relationship for the remainder for the heating phase and during cooling, integrates the lethal rate, and determines appropriate time to start cooling to achieve a desired process lethality. SD

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

896

Helwig (EJ) and Biber (HE). **The use of the scanning electron microscope in investigating container corrosion by canned foods and beverages.** *Food Microstructure* 9(3): 1990; 195-202

The scanning electron microscopy and energy dispersive X-ray micro-analysis play an important role in the study of corrosion e.g. stress corrosion cracking in packs of tuna and potatoes, pitting corrosion related to light coloured fruits and insufficient protection because of lacquer defects. SD

Chemistry

897

Akinpelu (OA). **Iron and copper uptake during the wet-milling of some Nigerian foods.** *Journal of Food Science and Technology (India)* 29(2): 1992; 108

Five food items, pepper, onion, tomato, fermented maize and dehulled cowpea, commonly wet-milled before further processing in Nigeria were milled with a commercially operated disc attrition mill for which the discs were made by local foundaries. The pH, moisture, Fe and Cu contents of the milled samples were determined using atomic absorption spectrophotometer for metal detn. The Fe content of the samples milled with a disc attrition mill was significantly higher than that of controls ($p < 0.01$) which measured the actual metal content of the samples while there was no significant uptake of Cu. AS

898

Tee (E-S) and Lim (C-L). **The analysis of carotenoids and retinoids. A review.** *Food Chemistry* 41(2): 1991; 147-193

The review defines the state-of-the-art of analytical methods for the study of carotenoids and retinoids particularly in foods and blood samples. Various preliminary sample treatment procedures, precaution to be taken during handling of samples and methods of separation and quantitation of these two groups of compounds are discussed in detail. 203 references. SD

Tokuoka (K) and Ishitani (T). **Minimum water activities for the growth of yeasts isolated from high-sugar foods.** *Journal of General and Applied Microbiology* 37(1): 1991: 111-119

Thirty five yeast strains isolated from high-sugar foods and related materials were determined for min. a_w needed for their growth. The min. a_w for growth of the yeasts depended on a_w controlling solutes as well as yeast sp. and strains. Most sp. showed the highest min. a_w for growth in NaCl-media and about half of the sp. showed the lowest min. a_w for growth in sucrose-media. One strain of *Zygosaccharomyces rouxii* had min. a_w for growth as low as 0.67 in fructose-media. Miso extract and koji extract rich in inositol, and casamino acid decreased min. a_w for growth of *Z. rouxii* in NaCl-media. Pre-incubation in the presence of high concn. of glucose and fructose also decreased min. a_w for growth of yeasts in glucose-media or fructose-media. BV

900

Cuq (JL) and Jaussan (V). **Caffeic acid oxidation and antibacterial effects.** *Sciences Des Aliments* 11(1): 1991: 25-36 (Fr)

The antibacterial effect of caffeic acid and of its oxidation derivatives was determined at pH 10 and under oxygen by HPLC. The bactericidal activity appears only after caffeic acid oxidation and in alkaline conditions. This effect can be the result of the condensation reaction between a quinone and the amino groups of lysine residues of bacterial proteins. BV

901

Pilkova (L), Pokorný (J) and Davidek (J). **Browning reactions of Heyns rearrangement products.** *Die Nahrung* 43(8): 1990: 759-764

The browning rate of HEYNS rearrangement products at 110 C under free access of oxygen is slower than that of AMADORI rearrangement products. The max. browning rate was observed at pH = 8.0. The browning was accelerated by Fe(III) and Cu(II) ions. The presence of Fe(II) ions, propyl gallate, and rutin caused lag phase but had no pronounced effect during the subsequent browning. Hydrogen peroxide bleached the melanodin pigments but did not destroy the browning precursors. Sulphites inhibited the browning reaction. Fluorescence spectra differed from those of the respective AMADORI products. AS

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

902

Hoskin (JC) and Wright (RE). ***Cryptosporidium*: An emerging concern for the food industry.** *Journal of Food Protection* 54(1): 1991: 53-57

A review article highlighting the magnitude of the problem caused by *Cryptosporidium* in the food industry. *Cryptosporidium* is a protozoan producing infective oocysts causing human diarrhoea that is fatal under certain conditions. No drug or treatment regime has effected a cure of cryptosporidiosis in man or animals. Standard cleaning and sanitizing solutions are not effective against *Cryptosporidium*, but the oocysts are susceptible to heat and drying. Simple diagnostic tests for detection of oocysts in food materials are not devised. Testing procedure are needed for routing detection of *Cryptosporidium* in animal food products and potentially contaminated food products. 73 references. BV

Bacteria

903

Kent (RA), Stephens (RS) and Westland (JA). **Bacterial cellulose fiber provides an alternative for thickening and coating.** *Food Technology* 45(6): 1991: 108

The production of cellulon fiber, a form of bacterial cellulose with an aerobic fermentation of glucose and other nutrients using a selected strain of acetobacter, its strong hydrogen bonding and viscosity properties are discussed. The water binding ability of the cellulon fiber provides an improved quality of surimi-based products and adds whiteness to colour of surimi gel samples. CSA

Listeria monocytogenes

904

Ita (PS) and Hutkins (RW). **Intracellular pH and survival of *Listeria monocytogenes* Scott A in tryptic soy broth containing acetic, lactic, citric and hydrochloric acids.** *Journal of Food Protection* 54(1): 1991: 15-19

The effect of citric, acetic lactic and hydrochloric acids on the growth, survival and intracellular pH (pH_{in}) values of *Listeria monocytogenes* Scott A were determined in a pH-controlled fermentation vessel. For most acids *L. monocytogenes* grown in tryptic soy (plus yeast extract) broth survived even when the pH was reduced to 3.5. Although citric and lactic acids were more effective in lowering the pH_{in} .

acetic acid had the greatest effect on cell survival. A greater than 4 log reduction in cell number occurred when *L. monocytogenes* was held in acetic acid-treated broth for 24 h at pH 3.5 even though the pH_{in} was 5.0. The results suggest that inhibition of *L. monocytogenes* by acids is caused not by a decrease in the intracellular pH, per se, but rather by specific effects of undissociated acid species on metabolic or other physiological activities. BV

Pseudomonas aeruginosa

905

Venkata Raman (K), Charyulu (NCLN) and Karanth (NG). **A mathematical model for the production of biosurfactants by *Pseudomonas aeruginosa* CFTR-6: Production of biomass.** *Journal of Chemical Technology and Biotechnology* 51(4): 1991: 525-538

The fermentation reaction producing biosurfactant using *Pseudomonas aeruginosa* CFTR-6 was studied. The progress of the bioreaction was monitored in terms of biomass production, product formation and substrate consumption in shake flask experiments using different initial sugar concn. A logistic model for biomass growth was found to be satisfactory. Av. estimates of the specific growth rate, biomass yield coeff. and maintenance coeff. were obtained. AS

Fungi

Mushrooms

906

Malizio (CJ) and Johnson (EA). **Evaluation of the botulism hazard from vacuum-packaged enoki mushrooms (*Flammulina velutipes*).** *Journal of Food Protection* 54(1): 1991: 20-21, 27

Flammulina velutipes, commonly known as the enoki or winter mushroom, is cultured aseptically in Japan and the United States and is vacuum-packaged in polyethylene film for retail sale. Because of the known potential hazard of botulism from agaric mushrooms that are packaged in plastic films, the safety of vacuum-packaged enokis was evaluated. Botulinal toxin was not detected by mouse assay in 148 packages from 14 independent lots when a rich medium containing trypticase-peptone-glucose-yeast extract, was added aseptically to the packages which were heat-shocked (60 or 80 C for 20 min) and incubated at 30 or 37 C. Botulinal toxin was produced when spores were added to the packages, but spoilage was evident prior to toxin formation. Toxin was not formed when the inoculated packages were kept

refrigerated (6 C). The results indicate that fresh vacuum-packaged enoki mushrooms do not present a botulism hazard when cultured aseptically and stored refrigerated. AS

Rhizopus oryzae

907

Yu (R-C) and Hang (YD). **Purification and characterization of NAD-dependent lactate dehydrogenase from *Rhizopus oryzae*.** *Food Chemistry* 41(2): 1991: 219-225

The enzyme NAD-dependent lactate dehydrogenase, purified by ammonium sulphate fractionation and polybuffer exchanger 94 chromatofocusing, had a specific activity of > 15 units/mg protein and its sodium dodecylsulphate-polyacrylamide gel electrophoresis pattern showed only one protein band. The mol. wt. of native enzyme was 131000 daltons and that of subunit 36000 daltons. The purified enzyme was stable at room temp., with pH about 7.5 and isoelectric point about 5.2. The k_m values for NADH, pyruvate and 2-oxobutyrate were 1.48, 6.40 and 54.4×10^{-4} M, resp. Activity was inhibited by Cd^{2+} , Fe^{2+} , Hg^{2+} , Pb^{2+} and Zn^{2+} but not by EDTA. SD

Yeasts

908

Peddie (FL), Simpson (WJ), Kara (BV), Robertson (SC) and Hammond (JRM). **Measurement of endogenous oxygen uptake rates of brewers' yeasts.** *Journal of the Institute of Brewing* 97(1): 1991: 21-25

The oxygen requirement of brewers' yeast varies with both the yeast strain and the physiological condition of the yeast and it has been suggested that an estimate of the amount required can be obtained from yeast oxygen uptake values (qO_2). Using two techniques (a batch aeration method and a continuous aeration method) it has been shown that the qO_2 value can change with time during the evaluation, due to physiological changes in the yeast. Since an assessment of the oxygen requirement is dependent on a representative measurement of qO_2 value, tests designed to estimate this parameter should incorporate the following features: (i) access of the yeast to oxygen should be restricted during sampling and at all times prior to analysis, (ii) qO_2 measurements should be made immediately before the yeast is pitched in the brewery, (iii) qO_2 value should be expressed on a per cell basis in order to eliminate the need for (time consuming) dry wt. detn. Time dependent changes in qO_2 values, which take place during the assay, can affect the precision of the test results. It has

been found that the use of high concn. of cells (1 - 2 g dry wt. Litre⁻¹) reduces this error. AS

909

Sheehan (CA), Weiss (AS), Newsom (IA), Flint (V) and O'Donnell (DC). **Brewing yeast identification and chromosome analysis using high resolution CHEF gel electrophoresis.** *Journal of the Institute of Brewing* 97(3): 1991: 163-167

Contour-clamped homogeneous electric field (CHEF) gel electrophoresis has been used to study the karyotypes of a range of *Saccharomyces cerevisiae* yeast strains. The time required from sampling yeast cultures to CHEF analysis was achieved within 6 h, making this procedure very useful in reference and quality control work in the brewing industry. Regions of the chromosome profiles were closely studied by adjusting electrophoresis conditions to increase resolution between bands. Both ALE and lager strains of brewing yeasts were studied along side haploid laboratory strains. By comparing different regions of the profiles even very closely related strains of lager yeast could be distinguished. Brewing strains consistently had significantly more chromosome bands than haploid laboratory strains. The electrophoretic karyotypes of brewing yeasts were represented as groups of bands on CHEF gels which apparently comigrated with their haploid chromosomal counterparts. AS

Hansenula anomala

910

Bellinger (Y) and Larher (F). **Salt tolerance and osmolyte composition of the yeast *Hansenula anomala* grown in the presence of fermentable or non-fermentable sources of carbon.** *Sciences Des Aliments* 11(1): 1991: 37-48

Hygiene

911

Sperber (WH). **The modern HACCP system.** *Food Technology* 45(6): 1991: 116, 118, 120

This article describes the recent improvements in the Hazard Analysis and Critical Control Point (HACCP) system. Aspects covered are the evolution of HACCP, HACCP principles (conduct hazard analysis and risk assessment, determine CCPs, establish specifications for each CCP, monitor each CCP, establish corrective action to be taken if a deviation occurs at a CCP, establish a record keeping system, establish verification procedures), hazard analysis and risk assessment (food intended for consumption by at-risk population, product

contains sensitive ingredient, no process step to eliminate hazard, recontamination potential before packaging, potential for product abuse, no terminal heat process), Pillsbury's hazard control plan and benefits. CSA

912

Kalish (F). **Extending the HACCP concept to product distribution.** *Food Technology* 45(6): 1991: 119-120

This article deals with the application of Hazard Analysis and Critical Control Point (HACCP) concept to the distribution of refrigerated juices. Different programs implemented has shown that the consumer complaints about the quality which has reduced by 40%. Proper product handling procedures to maintain high-quality products are also discussed. CSA

913

Daniels (RW). **Applying HACCP to new-generation refrigerated foods at retail and beyond.** *Food Technology* 45(6): 1991: 122, 124

Audits of temp. abuse of extended shelf-life refrigerated foods in supermarkets and homes illustrate opportunities such as improved refrigeration equipment, increased sales of thermometers and sanitizers for use in home refrigerators, new distribution systems, modified manufacturing programs, small-company opportunities, and new retailing approaches to apply Hazard Analysis and Critical Control Point programs. CSA

914

Beard (TDIII). **HACCP and the home: The need for consumer education.** *Food Technology* 45(6): 1991: 123-124

Unfamiliarity and expectations of the food products, price, defects and consumer mishandling are the causes for consumer dissatisfaction. Complete product satisfaction could be achieved only when the consumers are educated about the food handling practices such as checking containers at the store, handling the product properly on the way home, storing ingredients and foods properly, preparing food properly, keeping kitchen equipment hygienically clean, maintaining personal hygiene, storing prepared foods properly and managing pantries properly. Hazard Analysis and Critical Control Point system is one approach to take toward this resolution. CSA

915

Tisler (JM). **The food and drug administration's perspective on HACCP.** *Food Technology* 45(6): 1991: 125-127

The aim of the Food and Drug Administration to use Hazard Analysis and Critical Control Point system as an inspection tool to assure that only safe, high-quality, properly labeled and only legally acceptable food products are made available in the marketplace are discussed. CSA

916

Scarlett (T). **An HACCP approach to product liability.** *Food Technology* 45(6): 1991: 128, 133-134

This article discusses the evolution of the liability rules, the current product liability law, how rules relate with the HACCP system which is a quality control management technique that emphasizes on the identification of the mistakes during manufacturing process that can adversely affect the safety of food product and the development of specific methods to prevent the mistakes from happening. CSA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

917

Akermann (O), Wolff (N) and Riquet (AM). **Electron spin resonance study of the influence of shape and polarity of molecules on their absorption in crystal polystyrene: Nitroxides used as simulants of food components.** *Sciences Des Aliments* 11(1): 1991: 125-140

Antioxidants

BHT

918

Steiner (I). **Chemical investigations of oxidized butyl hydroxy toluene (BHT).** *Deutsche Lebensmittel-Rundschau* 87(1): 1991: 11-17 (De)

2,6-Di-tert-butyl-4-phenol (BHT) is often added as antioxidant for plastics used for the production of packaging materials for food stuffs. Sterilizing these materials e.g. with ozone BHT is oxidized to various substances. Compounds with peroxide groups, chinoic compounds, carbonic acids and keto acids were found by HPTLC and IR methods. A ketone, benzenone, two hydroquinones, and acid and two derivatives of furane were identified by GC/MS. A negative influence on flavour and taste of foodstuffs by these substances is possible. AS

Sweeteners

Aspartame

919

Keller (SE), Fellows (JW), Nash (TC) and Shazer (WH). **Application of bulk-free process in aspartame-sweetened frozen desert.** *Food Technology* 45(6): 1991: 106

A process developed for producing an aspartame-sweetened frozen dairy desert made without bulking agents and which would exhibit textural properties similar to those products containing bulking agents or sugar is described. The process uses the enzyme β -galactosidase (lactase) which allows increased milk solids nonfat (MSNF) levels in the desert. Sensory analysis to determine the utility of the enzyme treatment is conducted. The results show that increased MSNF and lactase facilitate the successful production of an aspartame-sweetened frozen dairy dessert without the addition of bulking agents. CSA

CEREALS

920

Bechtel (DB). **Preparation of cereals and grain products for transmission electron microscopy.** *Food Microstructure* 9(3): 1990: 241-251

This paper provides information on the preparation of cereals and cereal based products for microscopic analysis avoiding technical problems viz. sample treatment, chemical and physical fixation, dehydration, embedding, sectioning techniques, immunocytochemistry, enzymatic digestions, carbohydrate localization and lectin binding. SD

921

Munzing (K) and Bolling (H). **Microcalorimetric presentation of phase transitions and structure modifications in cereal starches.** *Getreide-Mehl und Brot* 44(5): 1990: 131-138 (De)

922

Benzing (L). **Possibilities for controlling insects in cereal based food.** *Getreide-Mehl und Brot* 44(5): 1990; 157-159 (De)

Barley

923

Bhatty (RS), MacGregor (AW) and Rossnagel (BG). **Total and acid-soluble β -glucan content of hulless barley and its relationship to acid-extract viscosity.** *Cereal Chemistry* 68(3): 1991; 221-227

The relationship between total and acid-soluble β -glucan and acid extract viscosity (AEV) was investigated in 13 genotypes of barley (12 hulless and one hulled low β -glucan mutant for comparison). The range in AEV was 3.0 - 145.5 cS; in total β -glucan, 3.9 - 5.4%. AEV was correlated (+0.83, $P < 0.01$) with total β -glucan percentage but with none of the other components of barley measured, such as starch, protein, pentosans, or their constituent sugars (arabinose and xylose). The acid-soluble fraction of barley contained 1.0 - 2.7% β -glucan, 0.8 - 2.7% starch, 1.6 - 2.2% nitrogen, and 0.2 - 0.6% pentosans (determined by GC), representing an av. of 44.7, 2.4, 81.8 and 14.8% resp., of their concn. in the grain. Thus, besides β -glucan, the major components of the acid-soluble fraction were nitrogen and pentosans. The correlations between AEV and soluble β -glucan, starch, and pentosans were +0.71, $P < 0.01$, +0.90, $P < 0.01$ and +0.61, $P < 0.05$, resp. The positive correlation between AEV and soluble starch seemed coincidental, as the latter contributed very little to AEV; viscosities of acid extracts of three genotypes of barley containing 0.9 - 2.7% starch were completely abolished in 15 min on addition of β -glucanase to the extracts. Earlier addition of protease and α -amylase to an acid extract of one genotype of barley did not lower viscosity significantly, but the viscosity was lowered by the addition of xylanase, a pentosan-hydrolyzing enzyme. The present data confirm that soluble β -glucan is largely, and pentosans are to a minor extent, responsible to AEV in spite of AEV's large variability in genotypes of hulless barley. AS

924

Roberts (CA), Marquardt (RR), Frohlich (AA), McGraw (RL), Rotter (RG), Henning (JC). **Chemical and spectral quantification of mold in contaminated barley.** *Cereal Chemistry* 68(3): 1991; 272-275

This work was conducted to estimate mold in barley by N-acetyl-D-glucosamine determined by ion-exchange chromatography and near-infrared

reflectance spectroscopy (NIRS). In one study, barley fungal contamination was assessed visually using a scale of 0 (no mycelia or spores) to 5 (prolific mycelial growth or spore production). The contaminated barley was then analyzed for glucosamine using ion-exchange chromatography. Glucosamine correlated highly ($P < 0.01$) with mycelia and spores; correlation coeff. were 0.86 and 0.85, resp. Glucosamine was quantified by NIRS; coeff. of detn. for calibration and performance exceeded 0.92. In a second study, a population of artificially contaminated barley was created by mixing mycelial dry matter with noncontaminated barley. Mycelial tissue in these samples was quantified by NIRS; the performance coeff. of detn. was 0.94. Based on results with naturally incubated samples, it was concluded that glucosamine determined by ion-exchange chromatography represented fungal contamination in barley and that it could be determined by NIRS. Based on the successful artificial calibration, it was concluded that mycelia at naturally occurring levels could be quantified by NIRS and that NIR spectrophotometers can detect mycelia directly, despite the empirical nature of NIRS technology. AS

925

Marlett (JA). **Dietary fiber content and effect of processing on two barley varieties.** *Cereal Foods World* 36(7): 1991; 576-578

Three barleys that had each been processed into a ready-to-eat (RTE) cereal product and one unprocessed barley were analyzed for soluble and insoluble dietary fiber content and composition. The total fiber differed between the unprocessed and processed barleys, 15.7 vs 12.2 - 12.4% (dry wt.), although their total contents of (1 $\rightarrow$ 3), (1 $\rightarrow$ 4)- β -D-glucan were the same - 5.1 and 4.8 - 5.4%, respectively. Neutral sugars in the insoluble fiber were reduced by processing, from 8.5% to an av. of 4.1% of the original sample dry wt. Of the β -glucan and total fiber in the processed barleys, greater than or equal to 90 and 48 - 57%, resp., were extracted into the soluble fiber fraction, in contrast to 73 and 31% from the unprocessed sample. These results suggest that processing barley into an RTE cereal product increased the analytical solubility of dietary fiber. The insoluble neutral sugar content was probably decreased as a result of pearling. AS

926

Henry (RJ). **Quantitation analysis of barley (1 $\rightarrow$ 3), (1 $\rightarrow$ 4)- β -glucanase isoenzymes by high-performance liquid chromatography.** *Journal of Cereal Science* 12(2): 1990; 187-192

The isoenzymes of (1 $\rightarrow$ 3), (1 $\rightarrow$ 4)- β -glucanase (EC 3.2.1.73) from malting barley were separated by high

performance cation-exchange chromatography. Separation was achieved in less than 20 min with high recoveries of enzyme activity. Isoenzyme 1 was the major component (63 - 82% of the total) after steeping and 48 h of germination suggesting that this isoenzyme may be the most important in determining the rate of modification. In a comparison of samples of 4 different var. Grimm, with the highest level of modification, also had the highest amount of isoenzyme 1. However, the var. Ronald apparently achieved higher modification than Bandulla by having more of enzyme 2, indicating that total β -glucanase activity determined the rate of modification. The var., Peyote, had the lowest level of enzyme 1 and total β -glucanase. Only isoenzyme 2 could be detected in kilned malt. AS

Oats

927

Anderson (JW), Hamilton (CC), Horn (JL), Spencer (DB), Dillon (DW), Zeigler (JA). **Metabolite effects of insoluble oat fiber on lean men with type II diabetes.** *Cereal Chemistry* 68(3): 1991: 291-294

This study examines the safety, tolerance and metabolic effects of insoluble oat fiber in a hospital and an ambulatory setting for men with type II diabetes. Eight lean men with non-insulin-dependent (type II) diabetes fed a traditional diabetes diet for 1 wk, followed by a control diet plus 30 g/day of insoluble oat-fiber for 2 wk in a hospital metabolic ward. The subjects resumed their normal diet + 30 g/day of insoluble oat fiber for an additional 10 wk. The hospital oat-fiber diet decreased fasting serum glucose (FSG) levels by 13% ($P < 0.05$), low-density lipoprotein cholesterol (LDL-C) by 8.9% ($P < 0.05$), and apolipoprotein B-100 by 17% ($P < 0.01$). Other serum lipid levels did not change significantly, and values returned to pretreatment levels during the ambulatory phase. This study suggests that an insoluble oat-fiber may have a beneficial effect on FSG and LDL-C levels in persons with type II diabetes. BV

928

Vollendorf (NW) and Marlett (JA). **Dietary fiber methodology and composition of oat groats, bran and hulls.** *Cereal Foods World* 36(7): 1991: 565-570

This review summarizes and compares the results of oat fiber measurements from several methods of dietary fiber analysis. Measurement of dietary fiber (gravimetric methods, chemical methods, recovery of solubilized fiber, soluble and insoluble fractions, classes of chemical components and assay for β -glucans) dietary fiber in oat groats, oat bran and

oat hulls are discussed in this review. 37 references. BV

Oat bran

929

Williams (PC), Cordeiro (HM) and Harnden (MFT). **Analysis of oat bran products by near-infrared reflectance spectroscopy.** *Cereal Foods World* 36(7): 1991: 571-574

Samples of commercially prepared oat bran were obtained from 4 oat milling companies and used to develop calibrations for soluble, insoluble and total dietary fiber, protein and starch using a near-infrared reflectance (NIR) scanning spectrophotometer. The Mongeau method was used as reference method for the fiber components. Calibration were developed using conventional regression and regressions involving principal component analysis (PCA) and partial least squares (PLS). Accuracy and precision of NIR predictions were adequate for quality assurance for all five constituents. Conventional and PCA/PLS regressions were not significantly different from each other in their ability to provide satisfactory calibrations. The weightings computed during development of PCA/PLS regressions may be useful in providing information about the factors affecting variance in composition. AS

Rice

930

Dziedzic (JD). **Romancing the kernel. A salute to rice varieties.** *Food Technology* 45(6): 1991: 74-78, 80

This article covers different forms of rice (brown rice, parboiled or converted rice, regular milled rice, pre-cooked rice) and the means used for classifying rice into long, medium and short-grain var. are discussed. Formulations provided by chefs are included to illustrate how some of the more unusual rice var. can be used to develop innovative products. Specially rices such as arborio rice, basmati rice, jasmine rice, sweet glutinous rice and wehani rice are also dealt. CSA

931

Champagne (ET), Hron (RJSr) and Abraham (G). **Stabilizing brown rice products by aqueous ethanol extraction.** *Cereal Chemistry* 68(3): 1991: 267-271

Brown rice (BR) kernels extracted with aqueous ethanol (EtOH) (95%, v/v) at room temp. (RT) (40 C approx.) lost less than 3% of the oil whereas

extraction at 70 C removed 15% of the oil. Thiamin retention was 91 and 37% in kernels extracted with EtOH at RT and 70 C resp. Little or no loss of protein, dietary fiber, carbohydrates, or minerals occurred in the extracted kernels. EtOH extraction decreased the microbial flora of the rice to very low levels and at RT or 70 C stabilised brown rice kernels to lipolysis. Flour prepared from kernels extracted with EtOH at 70 C was more stable to lipolysis. BR kernels extracted with EtOH at 70 C were susceptible to oxidative rancidity. BV

932

Juliano (BO), Hussain (A), Resurreccion (AP) and Bushuk (W). **Interference of phytate with extraction of protein from brown rice using 5M acetic acid.** *Cereal Chemistry* 68(3); 1991; 317-318

Patterns of 5M acetic acid extracts of milled and brown rices, obtained by aluminum-lactate (AL) polyacrylamide gel electrophoresis (PAGE) and reversed-phase HPLC, showed the presence of major glutelin proteins in milled rice that were absent in brown rice. Phytate in the bran fraction was shown to selectively bind glutelin in 5M acetic acid, since adding 1% sodium phytate to milled rice before extraction by acetic acid resulted in loss of some of the PAGE bands. Extraction of brown rice by 0.1M sodium acetate buffer pH 5 to remove unbound phytate before extraction of protein by acetic acid resulted in an AL-PAGE pattern similar to that of milled rice. AS

933

Horikoshi (M), Kobayashi (H), Yamazoe (Y), Mikami (B) and Morita (Y). **Purification and complete amino acid sequence of a major prolamin of rice endosperm.** *Journal of Cereal Science* 14(1); 1991; 1-14

Rye

934

Mano (Y), Nishiyama (S), Kojima (M), Ohnishi (M) and Ito (S). **Analysis of the molecular species of glycerolipids from rye grains by reversed-phase high-performance liquid chromatography.** *Cereal Chemistry* 68(3); 1991; 280-284

Rye protein

935

Tatham (AS) and Shewry (PR). **Conformational analysis of the secalin storage protein of rye (*Secale cereale* L.).** *Journal of Cereal Science* 14(1); 1991; 15-23

Triticale

936

Kulshrestha (K) and Usha (MS). **Biochemical composition and nutritional quality of triticale.** *Journal of Food Science and Technology (India)* 29(2); 1992; 109-110

Seven high yielding var. of triticale, namely 'Badger PM-118', 'UPT-72142', 'UPT-75182', 'UPT-76001', 'UPT-74304', 'UPT-7440' and 'UPT-75233' were analyzed for biochemical composition. Protein efficiency ratio (PER) of the highest yielding and highest protein containing var., 'UPT 72142', was determined. The protein (Nx5.7), Fe, Ca, P and riboflavin contents of the triticales were higher than those of Indian wheats. The triticales had a lower proportion of phytic Phosphorus than wheat. The PER of triticale chapathi indicated that it was superior to wheat chapathi. AS

Wheat

937

Shernaz Doongaji and Sabiha Vali. **Effect of wheat germ supplement to flour mixtures on growth, serum and liver proteins of weanling albino rats.** *Journal of Food Science and Technology (India)* 29(2); 1992; 125-126

Cereal flour mixture with the addition of wheat germ were fed to weanling albino rats at 10% protein level. Diets with 1:1 ratio of flour to wheat germ promoted max. wt. gain and PER. No significant difference was observed in the total serum protein level of animals in experimental groups as compared to the casein fed group. The serum albumin level as well as the liver protein reflected a significant increase. It is concluded that wheat germ can be used as an effective supplement for improving the nutritive value of cereal flour mixtures. AS

938

Primard (S), Graybosch (R), Peterson (CJ) and Lee (J-H). **Relationship between gluten protein composition and quality characteristics in four populations of high-protein, hard red winter wheat.** *Cereal Chemistry* 68(3); 1991; 305-312

939

Westerlund (E), Andersson (R), Hamalainen (M) and Aman (P). **Principal component analysis - an efficient tool for selection of wheat samples with wide variation in properties.** *Journal of Cereal Science* 14(1); 1991; 95-104

940

Pena (RJ), Amaya (A), Rajaram (S) and Mujeeb-Kazi (A). **Variation in quality characteristics**

associated with some spring 1B/1R translocation wheats. *Journal of Cereal Science* 12(2); 1990: 105-112

Advanced lines (295) from CIMMYT's International Bread Wheat Screening Nursery, a large proportion of which carry the 1B/1R translocation, were examined in terms of their sodium dodecyl sulphate (SDS)-sedimentation volumes and Alveograph characteristics, as well as their dough mixing and breadmaking properties. A significant quality trait variability was observed for all parameters evaluated. Comparison of sister lines with and without the 1B/1R translocation showed that variations in SDS-sedimentation volume, Alveograph characteristics, dough mixing and baking properties cannot be attributed exclusively to the presence of the 1B/1R translocation. Finally, the poor breadmaking properties, particularly dough stickiness associated with one Mexican (Glennson 81) and two Australian (QT-2870 and SUN-89D) cv could not be confirmed when doughs were mixed under medium-speed mixing conditions. Therefore, the dough stickiness problem seems to be an attribute restricted mainly to high-speed mixing conditions characteristic of some modern breadmaking processes. AS

941

Dhaliwal (AS) and MacRitchie (F). **Contribution of protein fractions to dough handling properties of wheat-rye translocation cultivars.** *Journal of Cereal Science* 12(2); 1990: 113-122

942

Sutton (KH), Hay (RL), Mouat (CH) and Griffin (WB). **The influence of environment, milling and blending on assessment of the potential breadmaking quality of wheat by RP-HPLC of glutenin subunits.** *Journal of Cereal Science* 12(2); 1990: 145-153

The relationship between specific glutenin protein fractions quantified by reversed-phase high performance liquid chromatography (RP-HPLC) and the baking performance of samples has been investigated further. Loaf volumes and overall breadmaking quality (bake score) in an optimized MDD test baking procedure were predicted for 234 samples using regression equations developed previously. These samples represented var. from New Zealand and overseas. They were grown in many locations (in New Zealand and Australia) and over several seasons. Flours from wheats possessing the rye 1B/1R gene-translocation and commercial flour grists (blends) were also studied. The predicted baking performance results from RP-HPLC had smaller sums-of-squares of errors than models based on grain protein content. The

confidence limits for baking performance prediction allow the distinction between poor and good quality flour to be made easily. AS

943

Dhaliwal (AS), Mares (DJ) and Marshall (DR). **Measurement of dough surface stickiness associated with the 1B/1R chromosome translocation in bread wheats.** *Journal of Cereal Science* 12(2); 1990: 165-175

944

Hakansson (B) and Jagerstad (M). **The effect of thermal inactivation of lipoxygenase on the stability of vitamin E in wheat.** *Journal of Cereal Science* 12(2); 1990: 177-185

Less than 10% of the vitamin E in wholemeal and white wheat flours was retained after drum-drying. This extensive destruction of vitamin E may be due to lipid degradation. It is known that tocopherols are oxidized by the co-oxidation reaction of lipoxygenase. The study showed that the loss of vitamin E started immediately on mixing the flour with water, which is the first stage in the drum-drying process. The loss increased as the storage time of the flours increased. It also increased as the temp. of the flour-water slurry increased, even though lipoxygenase activity was inactivated in the hot slurries. When lipoxygenase was heat-inactivated by low moisture processes, such as steam flaking and microwave-treatment, vitamin E retention was improved. The extent of the vitamin E losses can be ascribed to enzymic or non-enzymic oxidation is not known. Both mechanisms seems to be important. Non-enzymic lipid oxidation was favoured by a two- to five-fold increase in pro-oxidative substances, such as iron and copper, during the drum-drying process. AS

Wheat bran

945

Posner (ES). **Mechanical separation of a high dietary fiber fraction from wheat bran.** *Cereal Foods World* 36(7); 1991: 553-556

A process to separate two new fractions from wheat bran has been devised. The method involves fine grinding of coarse wheat bran followed by air classification. One fraction contains 60.8% TDF and 3.5 mg% phytate. By implementing this process, phytate was reduced from 5.7 mg%, a reduction of over 38%. The second fraction has high protein and mineral content. The high fiber fraction, with an av. particle size of 375 microns, was used with satisfactory results in bread baking and preparation of fried noodles at levels of 20% and 11.5% (flour basis), resp. AS

Wheat flour

946

Sawant (BP), Bhuibhar (BW), Surve (VD), Sapre (DB) and Kanawade (LR). **Effect of premilling moisture content on selected characteristics of wheat flour.** *Indian Miller* 22(3): 1991: 11-13

Influence of premilling moisture content on fineness modulus av. particle size and uniformity index of wheat flour was studied using plate mill and hammer mill. It was observed that the fineness modulus increased from 2.34 to 3.15 in plate mill and 2.02 to 2.48 in hammer mill corresponding to increase in moisture content from 12.00 to 27.10% (w.b.). The av. particle size ranged from 0.53 to 0.92 mm in plate mill and from 0.42 to 0.58 mm in hammer mill with increase in moisture content from 12.00 to 27.10% (w.b.). The uniformity index ranged from 0:5:5 to 0:8:2 in plate mill and from 0:3:7 to 0:6:4 in hammer mill with increase in moisture content from 12.00 to 27.10%. There was no coarse fraction in the comminuted product. The relative proportion of medium fraction increased with moisture content in both mills producing less fines. SRA

947

Figueroa (JDC) and Khan (K). **The relationship of bromate requirement and sugars in breadmaking and implications for loaf volume potential of hard red spring wheat flours.** *Cereal Chemistry* 68(3): 1991: 284-290

948

Larsen (NG), Levick (SM), Mouat (CH) and Sutton (KH). **The effect of ball-milling on phospholipid extractability and the breadmaking quality of flour.** *Journal of Cereal Science* 12(2): 1990: 155-164

This paper describes the effect that ball-milling for various periods has on the mechanical dough development (MDD) breadmaking and physicochemical properties of flour. The quantity of water-saturated butanol-soluble phospholipid extractable from the flour at room temp. is negatively correlated with changes in loaf volume and positively correlated with MDD work input. However, this is an artefact of the starch damage caused by ball-milling. That is, phospholipid is acting as a marker for another variable and giving the false impression that a functional relationship may exist. Although there is an increase in protein solubility, wheat proteins analysed by reversed-phase high performance liquid chromatography (RP-HPLC) and polyacrylamide gel electrophoresis in the presence

of sodium dodecylsulphate (SDS-PAGE) do not appear to be functionally altered by ball-milling. AS

Wheat protein

949

Ng (PKW) and Bushuk (W). **Model of glutenin structure based on farinograph and electrophoretic results.** *Cereal Chemistry* 68(3): 1991: 321-322

950

Sutton (KH). **Qualitative and quantitative variation among high molecular weight subunits of glutenin detected by reversed-phase high-performance liquid chromatography.** *Journal of Cereal Science* 14(1): 1991: 25-34

951

Mascl (SM), Porceddu (E), Colaprico (G) and Lafiandra (D). **Comparison of the B and D subunits of glutenin encoded at the glu-D3 locus in two biotypes of the common wheat cultivar Newton with different technological characteristics.** *Journal of Cereal Science* 14(1): 1991: 35-46

952

Skerritt (JH), Frend (AJ), Robson (LG) and Greenwell (P). **Immunological homologies between wheat gluten and starch granule proteins.** *Journal of Cereal Science* 12(2): 1990: 123-136

Structural homologies between wheat (*Triticum aestivum* L.) gluten proteins and proteins present in well-washed starch granules were examined with a panel of mouse monoclonal and mouse and rabbit polyclonal antibodies, using immunoblotting, enzyme-linked immunosorbent assay (ELISA) and immunocytochemical methods. Many antibodies raised against gluten protein fractions cross-reacted with starch granule proteins (SGP), but often weakly. Antibodies with similar gliadin and glutenin subunit specificities had similar SGP specificities: (1) antibodies to high mobility (α -, β -, or γ -) gliadins cross-reacted weakly with low mol. wt. SGP (M_r 8000, 19000 and 30000) on immunoblots, and very weakly in indirect ELISAs. Some of these antibodies labelled both protein bodies and the periphery of starch granules in sections of immature grain, consistent with low mol. wt. SGP, deemed to be 'surface' SGP on the basis of extractability studies, indeed being present on the granule surface. (2) Monoclonal antibodies that bound γ and ω -gliadins and glutenin subunits bound to higher mol. wt. SGP, especially a protein of M_r 77000, at concn. only slightly above those which labelled gluten proteins. As the interior of the starch granule section was labelled, these proteins are likely to be 'integral' to

the granule. (3) Antibodies binding broadly to all major gluten protein classes also bound most high and low mol. wt. SGPs. Some starch proteins of M_r 15000, which have been associated with endosperm softness, appeared to be immunologically distinct. AS

953

Watterson (J), Shull (JM), Mohamed (AA), Reddy (V) and Kirleis (AW). **Isolation of a high-cysteine kafirin protein and its cross-reactivity with γ -zein antiserum.** *Journal of Cereal Science* 12(2): 1990; 137-144

Two methods were developed for the isolation of M_r 30k kafirin protein from immature sorghum, one involving direct extractions with 20% (v/v) 2-mercaptoethanol (2-ME) and the other involving extraction with 20% (v/v) 2-ME followed by reversed phase high performance liquid chromatography (RP-HPLC). The amino acid compositions of these isolated proteins were similar to each other and to a partially purified M_r 30 k kafirin from mature sorghum grain. These M_r 30k kafirins contained high levels of cysteine, proline and histidine, with low levels of aspartic acid and lysine. The mol. wt., solubility, amino acid composition of M_r 30k kafirin were similar to values published for maize γ -zein. Structural similarity between γ -zein and M_r 30k kafirin was demonstrated through an immunological study showing cross-reactivity of the M_r 30k kafirin protein and a γ -zein antiserum. This high-cysteine M_r 30k kafirin protein was named γ -kafirin based on similarities in mol. wt., solubility and structure between it and γ -zein of maize. AS

Wheat starch

954

Chinachoti (P), Kim-Shin (M-S), Mari (F) and Lo (L). **Gelatinization of wheat starch in the presence of sucrose and sodium chloride: Correlation between gelatinization temperature and water mobility as determined by oxygen-17 nuclear magnetic resonance.** *Cereal Chemistry* 68(3): 1991; 245-248

MILLETS

955

Ansari (N) and Sankhla (N). **Effect of fluoride and bio-regulants on the activity of peroxidase in *Vigna aconitifolia* and *Sorghum vulgare*.** *Science and Culture* 57(5/6): 1991; 142-144

A significant increase in the activity of peroxidase was observed in the leaves and roots of *Vigna*

aconitifolia and *Sorghum vulgare* following the treatment with fluoride. The highest concn. proved highly effective. A combination of fluoride and DKG additively increased the activity of peroxidase in *Vigna* seedlings. GS

Corn

956

Eckhoff (SR) and Tso (CC). **Wet milling of corn using gaseous SO_2 addition before steeping and the effect of lactic acid on steeping.** *Cereal Chemistry* 68(3): 1991; 248-251

Low-moisture corn kernels (Dekalb 636) were treated with gaseous SO_2 (0.1 and 0.2%) before steeping (6, 12, and 24 h) and compared with a standard 48 h control steep using the same SO_2 levels. Starch yields of the controls were not statistically different from those of the 12 h SO_2 steeps and were lower than those of the 24 h steeps. Brabender consistency was approx. 12% higher for the SO_2 -treated samples at 12 h than for the controls. The 6 h SO_2 -treated corn had higher Brabender consistencies, but starch yield decreased by approx. 3% at all treatment levels. Corns treated with 0.2% SO_2 showed increase in starch yields of 1.44, 2.08 and 2.35% for the 6-, 12- and 24-h steeps resp. Starch yields from 0.1% SO_2 + 0.55% lactic acid (added to steeping water) were greater than those from 0.2% SO_2 without lactic acid for all steep times. At the 0.1% treatment level, starch yields increased by 5.64, 4.96 and 4.44% for the 6-, 12- and 24-h steeps resp. BV

Corn flour

957

Cunningham (RL), Carr (ME) and Bagley (EB). **Polyurethane foams extended with corn flour.** *Cereal Chemistry* 68(3): 1991; 258-261

Five levels of unmodified corn flour (5, 10, 20, 30 and 40%, based on wt. of polyether polyol) were evaluated as fillers-extenders in rigid polyurethane foams. Densities of the flour-filled and control foams were similar (0.025 - 0.026 g/cm³) except for the foams containing 10% flour (0.029 g/cm³). The moisture in the flours at the various levels of addition appeared to have a significant effect on the structural formation of the foams. Force-deformation curves of foams with 5 and 10% flour were similar to those curves of the controls. Thermal conductivity of the foam filled with 10% flour was slightly lower (thus having greater insulating value) than were the values for the foam filled with 5% flour or the control foam (0.0232 versus 0.0242 W/m.K) (0.161 versus 0.168 BTU in./[ft².hr.[°]F]). Foams containing 5 and 10% flour

did not increase more than 5% in vol. when subjected to thermal or humid conditions for 14 days. At the 40% level, foams expanded 14 and 16% under thermal and humid conditions, resp. after 14 days. AS

Corn meal

958

Lue (S), Hsieh (F) and Huff (HE). **Extrusion cooking of corn meal and sugar beet fiber: Effects on expansion properties, starch gelatinization, and dietary fiber content.** *Cereal Chemistry* 68(3): 1991: 227-234

This study investigates the effect of particle size of sugar beet dietary fiber on extrusion puffing; determines the insoluble dietary fiber (IDF), soluble dietary fiber (SDF) and total dietary fiber (TDF) content of extrudates; evaluated their total ungelatinized and gelatinized starch content and degree of gelatinization. Increasing the percentage of sugar beet dietary fiber resulted in less radial expansion and more elongation of the products. Decreasing the particle size of sugar beet fiber improved both radial and longitudinal expansion. Increased screw speed caused more elongation but decreased radial expansion. The starch in raw materials was completely gelatinized after extrusion regardless of the dietary fiber content (0 - 30%). The IDF, SDF and TDF contents were not significantly different among extruded products containing 30% sugar beet fiber. IDF decreased by 0.6 - 1.7/100g of dry solid after extrusion cooking compared to the dietary fiber contents of the raw materials. The SDF increased slightly and TDF decreased slightly but the differences were not statistically significant. BV

Corn starch

959

Fanta (GF) and Christianson (DD). **Influence of poly (ethylene-co-acrylic acid) on the paste viscosity and gel rheology of corn starch dispersions.** *Cereal Chemistry* 68(3): 1991: 300-304

The rise in viscosity of aqueous starch suspensions during gelatinization was measured with a Brabender amylograph with and without poly (ethylene-co-acrylic acid) (EAA). Increases in paste viscosity were observed with as little EAA as 0.25 - 0.50 g/30 g of starch. EAA was added as a 5 - 10% solution in aqueous ammonium hydroxide, thus producing an alkaline pH during pasting. A similar but smaller increase in viscosity was also observed under near-neutral conditions, brought about by the removal of excess ammonia by evaporation. Gelatinization of starch in the presence of either poly (acrylic acid) or stearic acid caused no increase in

viscosity; this is consistent with the theory that EAA increases viscosity by pseudocross-linking starch through formation of helical inclusion complexes with more than one starch macromolecule. Although EAA increases the paste viscosity of aqueous starch dispersions, it reduces the strength of gels formed from starch pastes. Scanning electron micrographs and Fourier transform infrared analyses for EAA suggest that EAA does not promote disruption of starch granules but complexes with starch that has already been solubilized by heating in water. AS

960

Eckhoff (SR) and Tso (CC). **Starch recovery from steeped corn grits as affected by drying temperature and added commercial protease.** *Cereal Chemistry* 68(3): 1991: 319-320

The application of commercial protease to corn dried at high and low temp. (HTD corn and LTD corn resp.) to investigate the effects on wet-milling properties and on the yield and quality of starch. The starch yield of HTD corn improved by more complete starch-fiber and starch gluten separations; but the starch yield of LTD corn only by better starch-fiber separation. High drying temp. result in low starch yield mainly because of the increased difficulty in starch-gluten separation, which also results in low quality of wet-milled products. BV

Sorghum

961

Dhingra (M), Srivastava (S) and Chauhan (GS). **Nutrient composition and relationship between physico-chemical and sensory qualities of sorghum genotypes.** *Journal of Food Science and Technology (India)* 29(2): 1992: 97-100

The content of amino acids, tannins and physico-chemical characteristics were estimated in 8 sorghum genotypes viz. 'CSV-10', 'CSV-11', 'SPV-386', 'SPV-736', 'UPFS-3', 'UPFS-11', 'P-37' and 'P-151'. The chapathies made from the flours of all the genotypes were evaluated for sensory properties. The genotypes 'UPFS-11' had the lowest leucine (0.63 g/100g) whereas 'P-151' had the highest. The max. lysine was observed in 'UPFS-3'. Tannins ranged from 48 ('SPV-736') to 336 mg/100g ('P-37'). Correlation studies revealed significant positive correlation between grain hardness and texture of chapathi. Amylose had significant positive correlation with overall acceptability of chapathi. AS

962

Shull (JM), Chandrashekar (A), Kirdels (AW) and Ejeta (G). **Development of sorghum (*Sorghum***

bicolor (L.) Monench) endosperm in varieties of varying hardness. *Food Microstructure* 9(3): 1990: 253-267

Study on three sorghum var. with varying endosperm texture viz. hard, intermediate and soft revealed that the proportion of cells in the endosperm with a continuous protein matrix corresponded to the proportion of vitreous endosperm in the mature kernel. Even though the sequence of development was similar in all var., harder var. developed faster and the difference with the soft var. were visible as early as 15 DAHB. Hard var. had higher concn. of protein bodies than soft var. in the early stages of endosperm development. SD

PULSES

Cowpeas

963

Aremu (CY). **Selected physico-chemical properties of five varieties of cowpea.** *Food Chemistry* 41(2): 1991: 123-128

Five var. (Nigeria B7, Kano 1696, Vita 5, Farin Juda C and Ife Brown) of cowpea (*Vigna unguiculata*) showed varietal and/or seasonal variations in amylose, cooking time, swelling capacity and swelling time except in moisture and dry matter. A significant negative correlation ($r = -0.7$; $P < 0.02$) was established between amylose and swelling time during cooking. SD

Dry beans

964

Deshpande (SS) and Singh (RK). **Hemagglutinating activity of lectins in selected varieties of raw and processed dry beans.** *Journal of Food Processing Preservation* 15(2): 1991: 81-87

Serial dilution technique to study the effect of processing showed that lectin activity ranged $128 - 512 \times 10^4$ units/g of whole bean flour (307×10^4 av. units/g bean), small red and kidney beans had the highest hemagglutinating activities among the 10 var. of dry beans (*Phaseolus vulgaris* L.) and cooking of beans fully destroyed lectin activity. Dehulled beans showed no change and the germinated beans and protein conc. lower hemagglutinating activity. SD

Faba bean

Faba bean protein

965

Schneider (Ch) and Schmidt (G). **Some viscosity characteristics of faba bean protein isolates within a pH range relevant for foods.** *Die Nahrung* 34(8): 1990: 735-745

The rheological behaviour of concentrated aqueous dispersions of unmodified (FBPI-I) and acetylated (FBPI-II) faba bean (*Vicia faba* L. *minor*) protein isolates are investigated within a pH range of 4.0 up to 7.5. Besides the fact that equal concentrated dispersions of FBPI-I show a much lower apparent viscosity η than those prepared with FBPI-II, η and the flow behaviour index n depend also on the kind of preparation. Especially the direction of pH shifting and the mode of pH adjustment lead to marked differences of the rheological properties. In the case of FBPI-II dispersions a max. of η and n is shown at pH 5.5 to 6.5, seldom at pH 7.0, probably connected with a max. of the hydrodynamic vol. Holding the aqueous dispersions for 24 h caused mostly an increase of η and n . AS

966

Krause (J-P), Schultz (M) and Schmidt (G). **A method for the characterization of breakdown/reforming behaviour of faba bean protein dispersions.** *Die Nahrung* 34(8): 1990: 775-778

Lima bean

Lima bean starch

967

Hoover (R), Rorke (SC) and Martin (AM). **Isolation and characterization of lima bean (*Phaseolus lunatus*) starch.** *Journal of Food Biochemistry* 15(2): 1991: 117-136

Starch from large lima beans (*Phaseolus lunatus*) was isolated and some of the important characteristics determined. The yield of starch was 22% on a whole seed basis. The shape of the starch granules was round to oval to elliptical with granules $15 - 36 \mu\text{m}$ in diam. Scanning electron micrographs revealed presence of smooth surfaces. Gelatinization temp. range was $70 - 75 - 80^\circ\text{C}$ and amylose content was 34.5%. The starch exhibited high single stage swelling and moderate solubility in water. The x-ray diffraction pattern was of the C-type. The viscoamylographic examination on starch paste (6%, w/v) showed the absence of a peak viscosity, a high 95°C viscosity (700 BU) and a breakdown in consistency (60 BU) during the 95°C holding cycle. Scanning electron microscopy

showed that native starch granules were very resistant to attack by porcine pancreatic α -amylase. However, defatting slightly increased the extent of hydrolysis. The gel showed poor stability towards refrigerated storage and freeze-thaw cycling. The starch granules were highly resistant to acidic hydrolysis. AS

Navy bean

Navy bean flour

968

Lorimer (NL), Zabik (ME), Harte (JB), Stachiw (NC) and Ubersax (MA). **Effect of navy bean protein flour and navy bean globulin(s) on composite flour rheology, chemical bonding and microstructure.** *Cereal Chemistry* 68(3): 1991: 213-220

Substitution of 5 and 10% dry-roasted, air-classified high-protein flour (fines) for bread flour in farinograph studies increased absorption and lengthened arrival and peak times. The 10% level of substitution decreased stability. The globular proteins, phaseolin and G2 lectin, were separated from the navy bean fines and added to wheat dough systems in the same amounts as those in which they occurred in the 5 and 10% high-protein flour substitutions. Wheat starch was used to make up the remaining wt. Phaseolins and the combination of phaseolins and G2 lectins also increased absorption and arrival time, while decreasing departure time and dough stability. Investigation of the effect of phaseolin and G2 lectins on the rheologically active thiol and disulphides did not produce sufficient evidence to conclude that these globular proteins disrupted the disulphide interchange. Results of low-temp. scanning electron microscopy support the rheological studies. AS

Peas

969

Henderson (HM), Blank (G) and Sustackova (H). **Thermal inactivation of pea flour lipxygenase.** *Journal of Food Biochemistry* 15(2): 1991: 107-115

Lipxygenase (LOX) was determined in pea flour (9.6% moisture) samples which had been exposed to 90 - 130 C for 5 - 45 min, and in crude aqueous extracts (5%; pH 6.7) of previously unheated pea flour which had been exposed to 40 - 80 C for 5 - 30 min. The rate of thermal inactivation of pea LOX was shown to follow first-order reaction kinetics. The rate constants, $k(\text{min}^{-1})$, ranged from 0.005 to 0.252 for the flour, and from 0.068 to 0.267 (60 - 80

C) for the crude extract. The respective thermodynamic values were: for the energy of activation (E_a), 126.2 and 64.6 kJmole^{-1} ; for the enthalpy of activation ($\Delta G^\ddagger$), 123.1 and 61.8 kJmole^{-1} for the energy of activation ($\Delta G^\ddagger$), 118.0 and 101.4 kJmole^{-1} . The greater thermostability of LOX in the pea flour under dry-heat conditions, and the observed differences in the E_a , $\Delta H^\ddagger$ and $\Delta S^\ddagger$ values, may be accounted for by its possible complexation with other macromolecules and by the structure of the water surrounding the native enzyme. AS

OILSEEDS AND NUTS

970

Punjrath (JS), Devdharma (VD), Murthi (TN) and Aneja (RP). **Utilization of (edible grade) oilseed extractions for the manufacture of texturized dal analogues.** *Journal of the Oil Technologists Association of India* 23(1): 1991: 16-19

The extrusion process for commercial manufacture of texturized dal analogues for human consumption has been standardised. The optimum processing conditions are described. Dal analogues were prepared containing 20, 30 and 40 parts of edible defatted soy flours and the rest with maize flours. Experiments with flour blend containing 30 and 50% low-fat edible grade groundnut meal and the rest with maize flour were also carried out. Dal analogue with 0.6 ml/g bulk density, 16.3 to 23.5% protein was prepared from 30% soy flour or 50% low-fat groundnut meal. The protein content of dal analogues containing soy extractions increased from 15.1 to 23.8% as addition of the oilseed extraction increased from 20 to 40%. In groundnut, low-fat meal at 30 and 50% level of incorporation, the dal analogue had 16.3 to 23.5% protein. The bulk density of the soy product ranged from 0.4 to 0.8 g/ml and that of groundnut meal was 0.6 g/ml for both 30 and 50% groundnut products. The oil content of the product with defatted soy meal was 3.0 to 3.4% and with groundnut meal it was 3.8 to 6.4%. Fried Bengal gram had an oil content of 18.5% whereas protein content was 19.7%. The blends containing 30% defatted soy flour and that containing 30 and 50% low-fat groundnut flour gave dal analogues with bulk density close to each other. Max. expansion (texturization) of soy based analogue of 1.44 to 1.77 mm was obtained at 0.2% l/m water flow rate and max. expansion index of 1.42 to 1.55 was obtained at the same water flow rate for groundnut meal based products. Sensory evaluation dal analogues with 1.42 to 1.55 to 1.77 mm expansion index was acceptable in texture at 30% level of protein. At higher levels of soy flours (40%) the acceptability of the product was poor. SRA

Coconuts

971

Balachandran (C) and Arumughan (C). **Solubility and electrophoretic characteristics of proteins in different regions of coconut endosperm.** *Journal of Food Science and Technology (India)* 29(2): 1992: 91-96

A market concn. gradient in the increasing order was observed for proteins from the inner to the outer regions of coconut endosperm. The testa and coconut water showed lower levels of protein concn. However, non-protein nitrogen did not show any appreciable variation. Fractionation of proteins showed that more than 80% of the proteins from the different regions were soluble in aqueous and salt media. Solubility of the proteins in water and 5% NaCl (0.86 M) was determined in the pH range 1 to 10. The outer and testa regions showed different solubility characteristics both in aqueous and in salt media. Electrophoresis of the major albuminous and globular proteins showed the presence of 6 and 4 protein bands of mol. wt. ranging from 14,000 to 52,000 and 17,500 to 45,000 resp. The various regions from the inner to the outer had the same electrophoretic profile, but showed significant differences in their quantities with respect to the major and minor protein bands. However, the testa region showed max. variations for all the parameters studied. AS

Rapeseeds

972

Truscott (RJW) and Tholen (JT). **Total glucosinolate content in rapeseed using reflectance.** *FAT Science Technology* 92(7): 1990: 272-274

A method has been developed for the detn. of total glucosinolate content in rapeseed. Following selective hydrolysis of glucosinolates by the endogenous myrosinase in rapeseed, the glucose produced is detected with commercially available glucose test strips. The intensity of the colour on the strips is measured using a portable reflectometer. This method is suitable for use by plant breeders and for the detn. of glucosinolate content in commercial rapeseed loads. AS

973

Meshehdani (T), Pokorny (J), Davidek (J) and Panek (J). **The lipoxxygenase activity of rapeseed.** *Die Nahrung* 34(8): 1990: 727-734

Zero-erucic rapeseed had both the lipoxxygenase-I and lipoxxygenase-II activity, both of which should be

taken into account on storage of seeds. The lipoxxygenase-II activity (the max. at pH = 6.5 - 6.8) is lower but the optimum pH is close to that of ground seed (pH = 6.3). The extent of lipoxxygenase-catalyzed oxidation increased in presence of natural rapeseed lipids. The content of conjugated double bonds of lipid hydroperoxides produced as primary reaction products was in close linear relation with the content of total oxidized products determined by HPLC. The content of conjugated double bonds in defatted rapeseed meal containing addition of linoleic acid, linolenic acid, or methyl linoleate, resp., reached its max. in 3 - 6 min. There was great variability among the lipoxxygenase activities of different rapeseed samples. AS

Soybeans

974

Sharma (YK) and Subramanian (N). **Nutritional evaluation of Kalitur (Glycine max.) protein and their major fractions.** *Indian Journal of Nutrition and Dietetics* 28(2): 1991: 41-45

Soybean (Glycine max.) var. Kalitur and Bragg (yellow var.) were evaluated for proteins and their major globular fractions 11S and 7S. The available lysine content of Kalitur and Bragg flour were 4.79 and 5.03% resp. of the total lysine content of 5.69 and 5.35% resp. The content of all the essential amino acids in Kalitur and Bragg flour proteins and their fractions were lower than that of egg protein. The essential amino acid content of 11S protein fraction of Kalitur and Bragg var. were 36.34 and 36.94 and the 7S protein fraction were 38.61 and 38.67% respectively. The chemical scores of proteins in the defatted flours of Kalitur and Bragg var. were 59.4 and 58.6 respectively. Kalitur 11S and 7S protein fractions had superior chemical score than Bragg var.; 69.47 as against 51.32 for the 11S protein fraction and 51.89 as against 42.78 for 7S protein fraction. GS

975

Om Kumar, Salkia (LB) and Kannur (SB). **Proximate and mineral composition of soybean seeds grown in North Eastern region.** *Journal of Food Science and Technology (India)* 29(2): 1992: 111-112

The proximate composition of the seeds of 12 var. of soybean viz., 'Kalitul' 'TS-74-24-2', 'T-49', 'PK-416', 'PK-472', 'PK-453', 'PB-1', 'PK-327', 'MACS-13', 'TS-73-16', 'Bragg' and 'Ankur' suggests that they are good sources of protein (32.35 to 37.56%), fat (18.76 to 206.92%), carbohydrates (25.02 to 31.51%), minerals (4.50 to 5.46%), and energy (429 to 440 Kcal/100 g). On ash fractionation, mineral content was found to be in the range of 0.48 to 0.61, 1.56 to 1.92, 0.024 to 0.063, 0.094 to 0.281, 0.352

to 0.733 and 0.0044 to 0.0163% for Na, K, Ca, Mg, P and Fe respectively. The soybean seeds are rich in Na, K and P contents. AS

976

Yamauchi (F), Yamagishi (T) and Iwabuchi (S). **Molecular understanding of heat-induced phenomena of soybean protein.** *Food Reviews International* 7(3); 1991; 283-322

This review covers chemical structure of soy proteins, heat denaturation of glycinin, β -conglycinin, conformational studies of native and denatured states of β -conglycinin. 116 references. BV

977

Taira (H). **Quality of soybeans for processed foods in Japan.** *JARQ (Japan Agricultural Research Quarterly)* 24(3); 1990; 224-230

This paper reviews the status of the quality of soybeans consumed in Japan in connection with the suitability in processing Japanese soybean products. Aspects covered include: quality for food processing (tofu, miso and natto), variation of the beans quality and its suitability for processing and factors inducing variations in the chemical composition. BV

Soy proteins

978

Fukushima (D). **Recent progress of soybean protein foods: Chemistry, technology and nutrition.** *Food Reviews International* 7(3); 1991; 323-351

This paper deals with the importance of the three-dimensional structures of soybean molecules in the technology of the traditional and non-traditional soybean protein foods, the recent progress in the nutrition and physiological function of soybean proteins, the application of a new biotechnology for traditional fermented soybean protein foods and the recent development for new soybean protein foods with original characters, in which soybean proteins are a main and key material. 29 references. SRA

TUBERS AND VEGETABLES

979

Kubo (Y), Inaba (A) and Nakamura (R). **Respiration and C_2H_4 production in various harvested crops held in CO_2 -enriched atmospheres.** *Journal of the*

American Society for Horticultural Science 115(6); 1990; 975-978

The respiration rate (O_2 uptake) and the rate of C_2H_4 production were measured before, during and after 24 h of treatment with 60% CO_2 (20% O_2) in 18 kinds of fruits and vegetables by use of an automated system connected to a microcomputer. High CO_2 decreased respiration only in climacteric fruit and broccoli, which were producing C_2H_4 . Ethylene production decreased with CO_2 treatment of peaches, tomatoes and broccoli, but that of bananas increased. In 5 nonclimacteric fruits (3 citrus sp., grapes and Japanese pears) and several vegetables (carrots, onions, cauliflower and cabbage), in which C_2H_4 production was not detected, high CO_2 affected respiration little, if at all. When eggplants, cucumbers, podded peas, spinach and lettuce were treated with high CO_2 , C_2H_4 production began and respiration increased. The results indicate that the respiratory responses of harvested horticultural crops to high CO_2 might be mediated by the effects of CO_2 on the action and/or synthesis of C_2H_4 . AS

Taro

980

Nip (WK) and Wei (PS). **Preliminary study on the grouping of taro (*Colocasia esculenta* (L.) Schott) by isoelectric focusing.** *Food Chemistry* 41(2); 1991; 117-122

Based on the distribution of prolamin and albumin bands and uniqueness of some of the bands, nine taro cvs from American Samoa and Hawaii were categorised into group I consisting of Niu'e, Manu'a and Lehua, group II Matagi Fanua, Pula Sama, Samoa, Apii and an yellow cv and group III Palagi. SD

Potatoes

981

Sandhu (KS) and Bhupinder Kaur. **Effect of storage and pre-treatments on potato chip colour quality.** *Journal of Food Science and Technology (India)* 29(2); 1992; 113-114

A study was conducted, on potato var., 'K. Jyoti', 'K. Badshah' and 'K. Chandramukhi' to investigate the effect of storage temp. and various pre-treatments of potato slices on the chip colour quality. The var. were stored at 5 plus or minus 2 C, 11 plus or minus 2 C and 23.5 - 37 C (ambient conditions). Initial analysis showed that 'K. Jyoti' var. was best for chip colour. During storage under ambient conditions 'K. Chandramukhi' retained very good colour quality of fried chips upto 10 wks while other var. were

assessed lower in colour quality. None of these var. were found suitable for chips after storage at 5 plus or minus 2 C and 11 plus or minus 2 C due to poor colour quality even after reconditioning at 20 C for one month. Among the various pre-treatments given to slices of stored potato, blanching in water at 80 C for 1 min was found to be optimum and was very effective in improving the colour of chips while the chips obtained after treating the slices with absolute ethanol for 5 min followed by dipping 0.2% potassium metabisulphite solution for 5 min was best among the chemical pre-treatments and assessed next in colour to that obtained after blanching. AS

982

Jadhav (SJ), Mazza (G) and Salunkhe (DK). **Terpenoid phytoalexins in potatoes. A review.** *Food Chemistry* 41(2); 1991: 195-217

Chemistry, extraction, separation and assay, biosynthesis and metabolism of terpenoid phytoalexins in potatoes are summarized. The molecular structures and physico-chemical properties of major and minor terpenoid phytoalexins of potatoes are presented and their characterization and function are discussed. 64 references. SD

Sweet potatoes

983

Dawkins (NL) and Lu (JY). **Physico-chemical properties and acceptability of flour prepared from microwave blanched sweet potatoes.** *Journal of Food Processing Preservation* 15(2); 1991: 115-124

Flours from microwave blanched/steam blanched/unblanched 'Jewel' sweet potatoes showed significant differences ($P < 0.05$) in moisture, ash, starch, sugar and thiamin but no difference in L-values. Microwave/steam blanched flours, being comparable in oil and water-holding capacity/viscosity were deeper in yellow-orange colour than the unblanched one. Microwave blanched flour with 18% high yield showed significantly smaller a-values and greater b-values for unblanched flour and gave better quality bread, cake and cookies. SD

Vegetables

984

Karovicova (J), Polpnsky (J), Drdak (M) and Pribela (A). **Determination of nitrates in vegetables by capillary isotachophoresis.** *Die Nahrung* 34(8); 1990: 765-767

The present paper deals with the detn. of nitrates by capillary isotachophoresis. The detn. was tested on vegetable samples bought in the shop and the market hall. High nitrates concn. in vegetable is mainly due to the excessive nitrogen content in the soil system, thus deteriorating the nutritional and hygienic values of products and complicating the processing and storage. Hence increased attention is paid to nitrates not only by medical staffs, especially by hygienists, but also by farmers, nutritionists and, to a certain degree, also by consumers. At present, various analytical methods are used to determine nitrates in biological material, such as the spectrophotographic and potentiometric methods. Nitrates may also be estimated by polarography, AAS, GC, HPLC and capillary isotachophoresis (ITP). AS

Tomatoes

985

Marangoni (AG) and Stanley (DW). **Studies on the long-term storage of mature, green tomato fruit.** *Journal of Horticultural Science* 66(1); 1991: 81-84

Greenhouse-grown mature-green tomato fruit (*Lycopersicon esculentum* cv. Caruso) were stored under air or modified atm. (MA-3% O₂ plus 2% CO₂) at 6 and 12 C followed by ripening for 7 days at 22 C. Treatments with aqueous solutions of Ca, EDTA, EGTA, BHT, α -tocopherol and paclobutrazol were applied as dips to assess their ability to prevent chilling injury (CI) or retard senescence. Chemical treatments were not beneficial to the quality attributes of the fruit relative to the control, and MA storage did not alleviate CI symptoms relative to the air stored samples. Greenhouse-grown fruit could be stored for at least 30 days in the mature-green state at 12 C under MA with no detectable changes in quality for samples kept at 6 C showed marked deterioration after 15 days of storage under both air and MA. Samples stored at 12 C under an air atm. for 30 days ripened completely. Field-grown mature green tomato fruit (*Lycopersicon esculentum* cv. Heinz 91-29) stored at 12 C under MA could only be stored between 10 and 30 days due to heavy fungal infection. AS

986

Frank (R), Braun (HE), Ripley (BD) and Pitblado (R). **Residues of nine insecticides and two fungicides in raw and processed tomatoes.** *Journal of Food Protection* 54(1); 1991: 41-46

The objective of this study was to determine preharvest intervals for nine insecticides (acephate, azinphosmethyl, carbaryl, demeton, diazinon, dimethoate, endosulphan, malathion and

permethrin) and two fungicides (captan and chlorothalonil) in order to produce raw tomato fruit and juice with residue levels below 0.1 and 0.01 mg kg⁻¹, respectively. Over a 4 yr period (1985-88) ripe tomato fruit was commercially treated with these 11 pesticides and harvested on days 0, 1, 3 and 6, 7 or 8 after spraying. Residues of the 11 pesticides fell below 0.1 mg kg⁻¹ in juice and eight declined below 0.1 mg kg⁻¹ on raw fruit during the 0 to 8 day harvest period. Many of the pesticides required a longer preharvest interval than 6 - 8 days to attain a reduction in residue to 0.01 mg kg⁻¹. Tomato products including chili, catup, juice, paste and sauce were analysed for a wide range of pesticides and no detectable residues were found. BV

FRUITS

987

Jayaraman (KS) and Raju (PS). **Development and evaluation of a permanganate-based ethylene scrubber for extending the shelf-life of fresh fruits and vegetables.** *Journal of Food Science and Technology (India)* 29(2); 1992; 77-83

A shelf-stable and cost-effective granulated ethylene scrubber based on potassium impregnated in an inert matrix formulated using alumina and limestone was developed and evaluated against scrubber matrices like cement and silica-gel *vis-a-vis* an imported trade scrubber (U.K.). The Al₂O₃-limestone and cement based formulations showed satisfactory overall ethylene absorption, granule firmness and shelf-stability comparable to the trade product. Among the two absorbents, the alumina based formulation performed better than the cement based. Laboratory and large scale (on board ships) storage trials with mango, tomato, brinjal and okra at ambient temp. and/or 10 C and banana under ambient temp. only using the scrubber sachets/blankets showed an overall extension in shelf-life ranging from 3 - 8 days which is comparable to trade scrubber. The technique for production and packaging of the absorbent granules is simple, inexpensive and easy to adopt by small scale industry. The alumina and cement based scrubbers cost approx. Re. 0.18 and 0.06 respectively per kg fruit/vegetable to be stored as compared to Rs. 2.00 for the imported trade product. AS

988

Stoker (F). **Mixing, homogenization, deaeration of fruit and vegetable pulps.** *Fluessiges Obst* 56(9); 1989; 530-536 (De)

Apples

989

Roudot (AC), Duprat (F) and Pietri (E). **Simulation of a penetrometer test on apples using Voronoi-delaunay tessellation.** *Food Microstructure* 9(3); 1990; 215-222

Apple tissue was simulated based on computer graphics for penetrometric tests on apples. The study showed that irregular shape of the curve is due to the evacuation of collapsed cells just before the plunger whose shape has almost no influence on the result whereas the cell stiffness is the most influential one. Using penetrometer two measurements are obtained-firmness (mean value of the curve after skin peak) and its variation with depth (the slope of the curve). SD

Guava

990

Dutta (P), Banik (AK), Raychaudhury (R) and Dhua (RS). **Influence of ethylene absorbents on shelf-life of guava fruits.** *Indian Journal of Horticulture* 48(3); 1991; 213-216

The relative effectiveness of celite-KMnO₄ and silica-gel KMnO₄ mixture as ethylene absorbents in the storage of non-climacteric fruit, guava in sealed polyethylene bags has been studied. Mature green guava fruits cv. L-49 was harvested just prior to colour break stage with uniform sp. gr., and packed in 200 gauge LDPE bags containing celite-KMnO₄, silica-gel-KMnO₄ separately. Fruits in polyethylene bag without any ethylene absorbents was also maintained in order to study the effects of ethylene absorbent. Bags were stored at ambient temp. (29 - 32 C) and RH 82 - 85%. Fruit quality was assessed at 3-day intervals upto 15 days. The total soluble solids content, sugar, titrable acidity, and ascorbic acid contents were estimated. Celite-KMnO₄ mixture as ethylene absorbent was more promising as compared to silica-gel-KMnO₄ mixture for the storage of guava. The storage of fruits in LDPE bags celite-KMnO₄ mixture showed min. wt. loss, slower ripening during storage, and the fruit quality was good. SRA

Kiwifruits

991

Vial (C), Guilbert (S) and Cuq (JL). **Osmotic dehydration of kiwifruits: Influence of process variable on the colour and ascorbic acid content.** *Sciences Des Aliments* 11(1); 1991; 63-84

Mangoes

992

Vijay Sethi and Maini (SB). **Studies on storage of mango pulp.** *Indian Journal of Horticulture* 48(3): 1991: 228-231

PVC bottles, HDPE pouches (150 gauge) and glass bottles were used for preserving mango pulp with and without the addition of chemical preservatives. In bottles mango pulp was mixed with 1000 p.p.m. of SO₂ alone and 500 p.p.m. of SO₂ and 500 p.p.m. of sodium benzoate and stored at 25 - 35 C and 1 - 3 C for 1 yr and the changes in chemical composition and overall quality was determined. Mango pulp was also packed in PVC bottles and HDPE pouches and 500 p.p.m. SO₂ alone or 500 p.p.m. of SO₂ and 250 p.p.m. each of SO₂ and sodium benzoate were added and stored for 4 months at 25 - 35 C. Mango pulp was also stored for 3 months in HMHD film pouches (200 gauge) after adding SO₂ (50 and 75 p.p.m.) at 0 C, 24 - 28 C and 40 C. Glass bottles were found more suitable than PVC, HDPE, HMHD film for mango pulp storage. The pulp was acceptable sensorily upto 1 yr in glass bottles, 7 - 8 months in PVC bottles, 2 months in HDPE and 45 days in HMHD pouches. Addition of sodium benzoate to SO₂ was helpful in the retention of colour, but in its presence, there was slight increase in non-enzymatic browning and decrease in carotenoid pigments. Additions of SO₂ alone and storage in low temp. helped in the retention of carotenoids and flavour. SRA

Papayas

993

An (J-F) and Paull (RE). **Storage temperature and ethylene influence on ripening of papaya fruit.** *Journal of the American Society for Horticultural Science* 115(6): 1990: 949-953

Strawberry

994

Issanchou (SN), Maingonnat (JF), Guichard (EA) and Etievant (PX). **Oral consistency and simple rheological measurement of strawberry jams.** *Sciences Des Aliments* 11(1): 1991: 85-98

CONFECTIONERY, STARCH AND SUGAR

995

Gupta (JK), Rajesh Kaushik and Joshi (VK). **Influence of different treatments, storage temperature and period on some physico-chemical characteristics and sensory**

qualities of Indian honey. *Journal of Food Science and Technology (India)* 29(2): 1992: 84-87

Colour darkening of honey was significantly affected by the storage temp. and period. Storage of honey at 40 C resulted in deterioration of colour, increase in colloidal contents and complete inhibition of granulation. Addition of potassium metabisulphite reduced the darkening effect of honey at room temp., but did not affect the samples at 5 C. Heat treatment also reduced the darkening of honey and prevented granulation both at room temp. and 5 C for 60 and 90 days, respectively. The various treatments and storage period employed affected the sensory qualities of honey to a variable extent. Honey stored at 40 C was not liked due to perceivable after taste. In sensory qualities, unheated honey stored at 5 C was found to be the best. AS

996

Penichter (KA) and McGinley (EJ). **Cellulose gel for fat-free food applications.** *Food Technology* 45(6): 1991: 105

Advantages of cellulose gel used as additives to supplement food formulations to replace the functional, textural and flavour properties of fat are discussed. Different types of cellulose gel, such as the RC and CL types of Avicel cellulose gel, RCN-30, RCN-15 and RCN-10, their functionality and composition are also dealt. CSA

997

Ang (JF) and Miller (WB). **Multiple functions of powdered cellulose as a food ingredient.** *Cereal Foods World* 36(7): 1991: 558-559, 561-564

The use of certain fibers such as powdered cellulose at lower levels help to improve the quality of many products. Aspects covered in this article include: distinctive properties of powdered cellulose, improving cake vol., improving cake texture, fat reduction in fried foods (testing batters with cellulose and cake-type doughnuts) and water retention capacity and viscosity. BV

998

Oderinde (RA), Esuoso (KO) and Adesogan (EK). **The effects of lipids on the alcoholic fermentation of molasses using *Saccharomyces cerevisiae*.** *Die Nahrung* 34(8): 1990: 681-688

Confectionery

Chocolate

999

Koyano (T), Hachiya (I) and Sato (K). **Fat polymorphism and crystal seeding effects on fat bloom stability of dark chocolate.** *Food Microstructure* 9(3); 1990; 231-240

Reviewing the effects of seeding with fine crystal powders on physical properties of dark chocolates in terms of polymerism and crystallization behaviour of cocoa butter and of its major fat constituents, this paper gives details on replacement of tempering method in chocolate solidification process by a simple cooling technique using fat seed crystals. Although all powders accelerated crystallization and improved fat bloom stability except tristearoylglycerol, it is concluded that β_2 form of 1,3-dibehenoyl-2-oleyl-glycerol performs best. SD

1000

Precht (D). **Quantitative detection of milk fat in chocolate mixtures. I. Determination of milk fat in cocoa butter.** *FAT Science Technology* 92(4); 1990; 153-161 (De)

New methods for the quantitative detn. of milk fat proportions in cocoa butter samples based on GC analysis of fatty acids and triglycerides are described. 45 different cocoa butter types from 25 countries and 755 milk fat samples were analyzed by taking different feeding conditions into account. By means of triglyceride measurements mean relative deviations of approx. 5% from the 2 - 10% milk fat additions were established for known cocoa butter- and unknown milk fat composition. With completely unknown initial fats a mean relative deviation of approx. 6% was measured using fatty acid analysis. AS

1001

Precht (D). **Quantitative detection of milk fat in chocolate mixtures. II. Determination of milk fat in chocolate.** *FAT Science Technology* 92(7); 1990; 275-281 (De)

Using GC fatty acid analysis proportions of 4 - 12% milk fat additions varying in composition were quantitatively detected in different chocolate fats. Independent of the type of chocolate best recovery with mean absolute deviation of 0.64 and 0.68% was obtained using the fatty acid C4 and the combination C4-C6. Compared to milk chocolate most precise detection was achieved for milk fat additions to bitter chocolate. Here differences of

0.39%, on av., were observed between experimentally added and theoretically computed proportions. Unlike hazelnut or almond oil, coconut or palm kernel oil present in chocolate fats can hamper the measurements. Capillary column GC of the triglycerides allows sensitive indications of the presence of such vegetable fats in a chocolate mixture to be obtained. AS

Starch

1002

Chinachoti (P), White (VA), Lo (L) and Stengle (TR). **Application of high-resolution carbon-13, oxygen-17, and sodium-23 nuclear magnetic resonance to study the influences of water, sucrose and sodium chloride on starch gelatinization.** *Cereal Chemistry* 68(3); 1991; 238-244

Sugar

Gur

1003

Sudama Singh, Umrao Lal and Sharma (RK). **Temperature in relation to juice concentration in gur preparation.** *Indian Sugar* 41(9); 1991; 665-667

Experiment was aimed to find the optimum temp. at different stages of juice concn. for quality gur manufacture. At 48.6 C temp. the first scum started to accumulate on the surface of the conc. juice. The scum fully appeared on the surface at 85 C. The Deola water was added at 78.8 C and the hissing which started at 55 C was stopped at 78.8 C. The second scum formed was removed at 93.8 C. The boiling of the juice started at 97.8 C; the Chandoi was removed at 98.8 C from the conc. juice fog formation was at 100 C, frothing at 101.2 C and bubble forming at 107.6 C. Fuelling was stopped when the conc. juice reached 109 C. At 118 C the conc. mass was transferred into chak for cooling. In chak first light stirring was done at 106 C with second brisk stirring at 100 C and when the temp. came down to 87 C the mass was transferred to gur moulds. The fuel consumption at different stages of concn. has been tabulated in kg and in % over juice. SRA

Sugar cane

1004

Pavitrakar (NR), Bonde (RS) and Kalmegh (VB). **Clarification characteristics of cane varieties: CO-7219 and CoC-671 grown in Vidarbha region of Maharashtra State.** *Indian Sugar* 41(8); 1991; 621-622

Juice from cane var. Co-7219, and CoC-671 was clarified by hot liming defection process and heated to 80°C. Milk of lime at 10°Be was added to maintain 6.9 to 7.2 pH, heated to b.p. and allowed to settle the mud. Mud vol. was measured. After complete settling, clear juice was decanted and analysed for sp. gr., coeff. of purity, pH and compared with untreated control juice. The settled mud vol. was 34.9% in Co-7219 and 37.9% in CoC-671 and it was double in control. The rate of settling was 4.33 to 0.03 for Co-7219 and 4.15 to 0.027 cm/min for CoC-671. The coeff. of purity was 87.94 in Co-7219 and 85.98 in CoC-671. Sp. gr. of clarified juice declined in test var. accompanied with rise in purity. SRA

1005

Taneja (AD) and Punia (MS). **Effect of freeze temperature on quality indicators of cane juice.** *Indian Sugar* 41(8); 1991; 623-625

Seven sugarcane cv. (Co-6974, Co-7314, Co-7717, CoJ-64, Co-1158, Co-1148 and CoJ-58) were exposed to -4°C for 12 h and milled after 0, 2, 5 and 8 days of deep freeze exposure. Commercial cane sugar % (CCS %) decreased in all freeze exposed cv. except in Co-1148 and Co-7314; max. CCS % decrease was in Co-6974. Gum content increased max. in Co-6974 followed by CoJ-58, least gum content was in Co-1148 and Co-7314 at the same interval after the freeze-treatment. Titratable acidity increased significantly in the post-freeze period; the increase was correlated with the time lapsed after freeze exposure. Titratable acidity was min. in Co-1148, Co-7314 and Co-7717 as compared to other test var. The juice of Co-6974 registered highest increase in titratable acidity 8 days after the freeze treatment. The freeze treatment lowered the pH of juice in all var. Freeze exposure increased reducing sugar content in the post frozen period. The rate of inversion was low in the beginning after freeze treatment but later increased rapidly. It is concluded that Co-1148 and Co-7314 showed min. increase in titratable acidity, gum content and reducing sugars (%) and a lower fall in CCS % and pH in its juice than other var. SRA

BAKERY PRODUCTS

1006

Zwingelberg (H) and Brummer (J-M). **Baking machines in a mill laboratory.** *Getreide-Mehl und Brot* 44(5); 1990; 142-147 (De)

1007

Rocken (W), Haffke (H) and Kramer (H-D). **Problems with carrier material for fermenting doughs.** *Getreide-Mehl und Brot* 45(7); 1991; 203-206 (De)

1008

Seibel (W) and Brummer (JM). **Dietary fibers and the baking properties.** *Getreide-Mehl und Brot* 45(7); 1991; 212-216 (De)

1009

Lu (H) and Brummer (J-M). **Optimisation of evaluation and quality of Chinese steamed rolls.** *Getreide-Mehl und Brot* 45(7); 1991; 220-222 (De)

Bread

1010

Rasco (BA), Borhan (M), Yegge (JM), Lee (MH), Siffring (K), Bruinsma (B). **Evaluation of enzyme and chemically treated wheat bran ingredients in yeast-raised breads.** *Cereal Chemistry* 68(3); 1991; 295-299

The present study reports the chemical (acid, base, ethanol) or enzymatic (amylase, protease) modification of wheat bran to enhance the functional properties of bran in addition to increasing the total dietary fiber content of the foods to which the bran is added. Ingredients with the highest neutral detergent fiber content were produced using an α -amylase treatment or a combination of α -amylase and protease treatments. Protease treatment yielded ingredients with relatively poor baking properties. The breads containing bran treated with either α -amylase or α -amylase/calcium oxide had the best crumb grain score of the experimental fiber ingredients evaluated. BV

1011

Ludewig (H-G) and Seibel (W). **Optimization of recipes and shelf-life of Oblaten-gingerbread.** *Getreide-Mehl und Brot* 44(5); 1990; 151-157 (De)

1012

Mettler (E), Seibel (W), Elbaya (AW) and Pfeilsticker (K). **Experimental studies on the effects of emulsifiers and gums in order to optimize the quality of wheat bread. Part 2. Analytical and rheological studies on the effects of emulsifiers and gums in dough phase.** *Getreide-Mehl und Brot* 45(7); 1991; 206-210 (De)

1013

Wahrburg (U) and Martin (H). **Use of bread and rolls in a cholesterol-lowering diet. Part 2. Results of**

Dough

1014

Michniewicz (J), Biliaderis (CG) and Bushuk (W). **Effect of added pentosans on some physical and technological characteristics of dough and gluten.** *Cereal Chemistry* 68(3); 1991: 252-258

The effect of added water-soluble and water-insoluble pentosans of wheat (WS-W and WI-W, resp.) and water-soluble pentosans of rye (WS-R) on farinograph properties of wheat doughs, on the yield of wet and dry gluten, and on the solubility of doughs and gluten in acetic acid (HAc) and acetic acid-urea (AU) solvents was investigated. Additionally, the HAc and AU fractions were examined by gel-filtration chromatography and sodium dodecyl sulphate-polyacrylamide gel electrophoresis. All three pentosan preparations had a marked effect on farinograph properties: water absorption and dough development time increased. On an equal wt. basis, the WS-R pentosans produced the largest changes in these parameters. The effect of pentosans on gluten yield varied according to the characteristics of the base flour and the type and amount of pentosans added. In general, the yield of wet gluten decreased, particularly at the lower of the two levels (1 and 2%) of pentosan supplementation. Added WI-W and WS-R had a significant effect on the extractability of proteins from the dough and gluten of Katepwa (Canada western red spring wheat var.) with HAc and AU solvents. Adding pentosans decreased the amount of protein soluble in HAc and increased the amount in AU extracts for the dough samples; opposite trends were observed for the gluten. The results of gel filtration and electrophoresis show that WS-W and WI-W pentosans affect the aggregation-disaggregation processes of the high mol. wt. proteins and produce minor changes in the electrophoretic patterns of the HAc- and AU-soluble proteins. AS

Pasta

1015

Granfeldt (Y) and Bjorck (I). **Glycemic response to starch in pasta: A study of mechanisms of limited enzyme availability.** *Journal of Cereal Science* 14(1); 1991: 47-61

The aim of this work was to measure the availability of starch in pasta products and to study the mechanisms which affect the rate of digestion and absorption of starch in pasta. Healthy subjects were given test meals with an equivalent amount of

available carbohydrate from macaroni (25/75% durum/Swedish wheat flour), spaghetti (100% durum wheat flour + monoglycerides), 'spaghetti porridge' (cooked spaghetti mixed in a food processor) and, for comparison, bread (made from spaghetti ingredients) or mashed potatoes. Blood glucose levels were measured over a 3 h period and glycemic indices (GI) were calculated using 90 and 120 min areas under the glucose curves. A new *in vitro* test was introduced to measure the rate of starch hydrolysis in products with a food form 'as eaten'. The three pasta products produced significantly lower peak blood glucose values and lower GI (90 min) than the corresponding bread. The spaghetti also displayed a more favourable late post-prandial glucose response, with a low but sustained increment above the fasting level in the late phase. Significant differences between bread and mashed potatoes were only detected in the late phase. The 'lente' properties of the pasta were assigned to a restricted enzymic availability due to a more compact food texture. The importance of the food structure was further substantiated by a significant increase in GI following mixing of the spaghetti product. The *in vitro* method ranked the different wheat products similarly to the *in vivo* situation and is recommended for prediction of the glycemic response to various food items. AS

1016

Didone (G) and Pollini (CM). **Controlling of Maillard-reaction during THT drying of pasta.** *Getreide-Mehl und Brot* 45(7); 1991: 216-219 (De)

MILK AND DAIRY PRODUCTS

1017

Brooker (BE). **The adsorption of crystalline fat to the air-water interface of whipped cream.** *Food Microstructure* 9(3); 1990: 223-229

In normal whipped creams fat crystals were sparse, penetrated some of the bubbles and found in the plane of air-water interface whereas in the defective ones large numbers of needle-like crystals penetrated air-water interface of every bubble adsorbing reduced numbers of fat globules. Morphological evidence revealed that the crystals reached interface before the fat globules and that the needle-like crystals were dislodged by shear forces during whipping and adsorbed to bubbles. Possible mechanisms for low overrun and long whipping times in defective creams are discussed. SD

Milk

1018

Jaswant Singh. **Control of adulteration in milk with a simple device.** *Indian Dairymen* 44(1); 1992: 15-17

A simple metallic device based on the lectometer principle has been developed, which can be directly put in the vessel of the milk. This will give an on the spot indication of the extent of adulteration of milk which will be depicted on the graduated scale. The sketch of the adulteration tester is given. SRA

1019

Sharma (DK) and Joshi (DV). **Bacteriological quality of milk and milk products with special reference to Salmonella and its public health significance.** *Journal of Food Science and Technology (India)* 29(2); 1992: 105-107

Out of the 267 samples of milk and milk products examined, *Salmonella* spp. could be isolated from 5 samples of milk products. Among these, *S. weltevreden* and *S. enteritidis* could be isolated from the two samples each whereas *S. typhimurium* was isolated from one sample. Various other microorganisms isolated from these samples were *E. coli*, *Klebsiella* spp., *Pseudomonas* spp., *Alkaligenes faecalis* and *Proteus* spp. The public health importance of these findings is reviewed. 11 references. AS

1020

Attia (H), Bennisar (M) and Fuente (BTDL). **Study of the fouling of inorganic membranes by acidified milks using scanning electron microscopy and electrophoresis. I. Membrane with pore diameter 0.2 μm .** *Journal of Dairy Research* 58(1); 1991: 39-50

1021

Attia (H), Bennisar (M) and Fuente (BTDL). **Study of the fouling of inorganic membranes by acidified milks using scanning electron microscopy and electrophoresis. II. Membrane with pore diameter 0.8 μm .** *Journal of Dairy Research* 58(1); 1991: 51-65

1022

Augustin (M-A) and Clarke (PT). **Heat stability of recombined concentrated milk: Changes in calcium activity and pH on sterilization.** *Journal of Dairy Research* 58(1); 1991: 67-74

Recombined concentrated milks (18% SNF, 8% fat) at their natural pH and at pH values in the range 6.28 - 6.68, made with powders subjected to different preheat conditions (high heat (85 C, 30 min), indirect UHT (120 C, 2 min) and direct UHT (120 C, 2 min)), were sterilized at 120 C for 13 min. The heat stabilities of recombined concentrated milks were dependent on preheat treatment. Ca^{2+} activity and pH of sterilized recombined concentrated milks, measured 1 h after sterilization, were lower than those of corresponding unsterilized recombined concentrated milks. The magnitude of the decreases in Ca^{2+} activity and pH induced on sterilization were dependent on the pH of the unsterilized recombined concentrated milk but were not markedly influenced by the type of preheat treatment applied during powder manufacture. The results suggest that differences in heat stability of high heat, indirect UHT and direct UHT powders are unlikely to be due to Ca^{2+} activity. AS

1023

Banon (S) and Hardy (J). **Study of acid milk coagulation by an optical method using light reflection.** *Journal of Dairy Research* 58(1); 1991: 75-84

A turbidimetric method, based on light reflection, was used to study acid coagulation of reconstituted skim milk at low temp. Capillary viscosimetry, gelograph and laser granulometer techniques were also employed. Acidification of milk was produced by hydrolysis of glucono- δ -lactone. The general shape of the turbidimetric signal as a function of pH or time can be divided into three stages: a lag phase followed by a significant decrease and then a final rise. Two factors have a great influence on the development of milk turbidity, pH and temp. Dynamic viscosity measurements can be related to the turbidimetric signal while laser granulometric measurements cannot be correlated with changes in turbidity: the micelle size distribution remains constant until the first signs of gelation. As previous work showed, dynamic viscosity diminishes with acidification until a particular pH is reached (pH 5.9 at 15 C and pH 5.75 at 20 C). The latter period is related to the turbidimetric lag phase. As milk turbidity became lower than its initial value (pH 5.75 at 15 C and pH 5.55 at 20 C), dynamic viscosity increased significantly. The release of material from micelles (β -casein and Ca) could explain this phenomenon. In the same way, further increase of turbidity at a particular pH value (pH 5.3 at both 15 and 20 C) could be partly due to the reincorporation of soluble casein monomers in the micelle framework. As the onset of gelation was approached, turbidity still increased as a result of gel network formation. AS

1024

Singh (H) and Creamer (LK). **Influence of concentration of milk solids on the dissociation of micellar k-casein on heating reconstituted milk at 120 C.** *Journal of Dairy Research* 58(1): 1991: 99-105

Skim milks were prepared from skim milk powder at several concn. between 10 and 25% total solids and portions were pH-adjusted to between pH 6.3 and 7.1 and heated at 120 C. After ultracentrifugation (88000 g for 90 min), the supernatants were analysed using gel electrophoresis to determine the concn. of β -lactoglobulin, α -lactalbumin and k-casein. The dissociation of k-casein from the micelles was dependent on both the pH and the total solids content of milk before heating. Both higher pH (in the range 6.5 - 7.1) and higher concn. increased the extent of dissociation. A further series of samples were heated for 2 - 11 min at 120 C at pH 6.55. K-casein dissociation increased with concn. and with heating time. It was concluded that as the milk increased in concn., the pH at which micellar k-casein dissociated on heating was lowered. AS

1025

Doco (T), Carcano (D), Ramos (P), Loones (A) and Fournet (B). **Rapid isolation and estimation of polysaccharide from fermented skim milk with *Streptococcus salivarius* subsp. *thermophilus* by coupled anion exchange and gel-permeation high-performance liquid chromatography.** *Journal of Dairy Research* 58(1): 1991: 147-150

1026

Bradshaw (JG), Peeler (JT) and Twedt (RM). **Thermal resistance of *Listeria* spp. in milk.** *Journal of Food Protection* 54(1): 1991: 12-14

The thermal resistance of one strain each of *Listeria ivanovii*, *L. seeligeri*, and *L. welshimeri* and three *L. monocytogenes* strains was determined in raw and sterile milk. *Listeria* spp. suspended in milk at concn. of 1×10^5 cells/ml were heated at temp. ranging from 52.2 to 71.1 C for various contact times. The heat resistance of *L. monocytogenes* appeared somewhat greater than that of the other *Listeria* spp. in both milks, but the difference was not statistically significant ($\alpha = 0.05$). High-temp., short-time processing is adequate for pasteurization of raw milk. AS

Milk products

1027

Salminen (S), Gorbach (S) and Salminen (K). **Fermented whey drink and yoghurt-type product**

manufactured using *Lactobacillus* strain. *Food Technology* 45(6): 1991: 112

Gefilus fruit-flavoured whey drink and yoghurt-type product is fermented with *Lactobacillus* GG to produce a satisfying product especially suitable for consumers who do not like traditional fermented dairy products. Balancing of the intestinal function, controlling of both diarrhea and constipation are some of the various health benefits offered by the consumption of *Lactobacillus* GG fermented dairy products. CSA

Cheese

1028

Upadhyay (KG). **Pretreatment of milk for cheese manufacture and their significance.** *Indian Dairyman* 44(1): 1992: 26-40

The technological aspects of various pretreatments involved and their significance in cheese making are described. These include chilling and cold storage, lactoperoxidase/thiocyanate/H₂O₂ treatment, thermization, centrifugation, standardization, pasteurization, homogenization, lactose hydrolysis and concn. Each step has been described elaborately. SRA

1029

Groupe de Travail Cnerna "Flore Pathogene des Fromages". **Recommendations for identification of sources of coliform contamination in soft cheeses made from pasteurised milk.** *Sciences Des Aliments* 11(1): 1991: 171-183 (Fr)

Goat cheese

1030

Requena (T), Pelaez (C) and Desmazeaud (MJ). **Characterization of lactococci and lactobacilli isolated from semihard goats' cheese.** *Journal of Dairy Research* 58(1): 1991: 137-145

Several strains of *Lactococcus lactis* subsp. *lactis*, *Lactobacillus casei* and *Lb. plantarum* isolated from traditional goats' cheese have been studied for titratable acidity, proteolysis in milk and enzymic activities. Aminopeptidase activities were measured with whole cells and cells permeabilized with Triton X-100. Caseinolytic activity was investigated using electrophoresis in polyacrylamide gel with sodium dodecyl sulphate. *Lc. lactis* subsp. *lactis* had a level of proteolytic activity in skim milk greater than that of *Lb. casei*, while this activity in *Lb. plantarum* was very low. Alanine aminopeptidase activity was almost non-existent for all strains tested, while lysine aminopeptidase activity appeared to be of

fundamentally intracellular origin. Leucine aminopeptidase activity was also greater in cells that had been permeabilized than in whole cells for *Lb. casei* and *Lb. plantarum*. *Lc. lactis* subsp. *lactis* leucine aminopeptidase activity was greater in whole cells. No significant hydrolysis of casein was found with *Lb. casei* IFPL 725 and *Lb. plantarum* IFPL 722 permeabilized with Triton X-100 after 24 h incubation with whole bovine casein. AS

Mozzarella cheese

1031

Ghosh (BC) and Singh (S). **Quality of mozzarella cheese produced by using different milk clotting enzymes.** *Journal of Food Science and Technology (India)* 29(2); 1992; 115-116

Mozzarella cheese was prepared from buffalo milk standardized to 4% fat using microbial Meito and Modilase rennets and calf rennet as control. Modilase produced better quality cheese than Meito rennet. Good quality Mozzarella cheese could be prepared by microbial rennet. Body and texture of the cheese made by using modilase rennet were similar to the cheese made by using calf rennet. Fat and total solids recovery was more in the cheese made by using calf rennet whereas yield and melting were better in the cheese prepared by microbial rennet. Stretching was best in the cheese made by using calf rennet. AS

Khoa

1032

Christie (IS) and Shah (US). **Development of a three stage continuous khoa making machine.** *Indian Dairyman* 44(1); 1992; 1-4

The salient constructional and other features of a three stage khoa making machine has been outlined and diagrammatically represented. The first stage raises the milk solids level from 15 to 25%, the second stage from 25 to 50% and the third stage from 50 to 70%. The capacity is 50 kg of milk/h. Sensorily, the khoa and the flavour was slightly better than that prepared in a stainless steel kettle. SRA

Paneer

1033

Syed (HM), Rath (SD) and Jadhav (SA). **Studies on quality of paneer.** *Journal of Food Science and Technology (India)* 29(2); 1992; 117-118

Yield (18.24%) and total milk solids (53.16%) recovered were found to be highest in paneer

prepared from buffalo milk. Buffalo milk paneer was graded as "Excellent" and scored highest (93.33) for its overall sensory qualities. In the case of skim milk paneer, moisture, protein and ash were found to be max. The values obtained for hardness, gumminess and chewiness in case of skim milk paneer were highest while lowest values were obtained for cohesiveness and springiness. The highest and significant correlation coeff. of 0.85 was between springiness and fat whereas the lowest and non-significant correlation coeff. of 0.11 was between cohesiveness and fat. AS

1034

Babje (JS), Rath (SD), Ingle (UM) and Syed (HM). **Effect of blending soy milk with buffalo milk on qualities of paneer.** *Journal of Food Science and Technology (India)* 29(2); 1992; 119-120

The possibility of blending soy milk with buffalo milk for obtaining good quality paneer has been examined. Soaking soy dhal in sodium bicarbonate was preferred by consumer panel over other treatments. Addition of soy milk to buffalo milk up to 20% had no adverse effect on quality of paneer and resembled that of milk paneer in taste, colour and springiness. However, the paneer prepared by blending soy milk showed higher protein content. AS

Shrikhand

1035

Boghra (VR) and Mathur (ON). **Chemical quality of some marketed indigenous milk products: Major constituents and mineral composition of shrikhand.** *Journal of Food Science and Technology (India)* 29(2); 1992; 121-122

Shrikhand (a fermented milk product) collected from five shops of Anand (Gujarat) showed wide variations in total solids, fat, protein, carbohydrates, ash and pH values. The fat varied from 2.0 to 5.0%. All the samples, except one under organised dairy undertaking, did not conform to the min. limit of 8.5% as prescribed by Bureau of Indian Standards. Wide variations were also observed for different minerals in Shrikhand from various shops. The market samples also showed wide variations in citrate, Cu and Fe levels. AS

Meat

1036

Huhtanen (CN). **Inhibition of *Clostridium botulinum* toxin formation by *C. sporogenes* in culture media and in a meat system.** *Journal of Food Protection* 54(1): 1991: 50-52

Beef

1037

Egbert (WR), Huffman (DL), Chen (C) and Dylewski (DP). **Development of low-fat ground beef.** *Food Technology* 45(6): 1991: 64, 66-68, 70-71, 73

1038

Gudaszewski (T) and Lesiow (T). **Influence of proteolytic and lipolytic enzymatic preparations on rheological properties of beef.** *Die Nahrung* 34(8): 1990: 671-679

Products

1039

Shahidi (H) and Hong (C). **Evaluation of malonaldehyde as a marker of oxidative rancidity in meat products.** *Journal of Food Biochemistry* 15(2): 1991: 97-105

Poultry

1040

Kesava Rao (V), Ravindra Sharma and Kowale (BN). **Effect of chilling on poultry meat.** *Poultry Guide* 29(1): 1992: 51-54

Poultry meat is chilled for reducing the microbial growth rate; improving the product appearance; for getting higher overall product quality; and for prevention of off-flavours. Dry chilling, immersion chilling, stationary vat chilling, drag through units, portable tank chilling, continuous ice slush and water filtration systems and heat exchangers are the chilling methods usually employed. Advantages and disadvantages of these chilling methods are enumerated. GS

1041

Giddings (GG) and Marcotte (M). **Poultry irradiation: For hygiene/safety and market-life enhancement.** *Food Reviews International* 7(3): 1991: 259-282

This review covers aspects on the benefits offered by poultry irradiation (market-life extension through spoilage delay, control of microbial pathogens of fresh and frozen poultry, elimination of microbial pathogens in mechanically separated poultry meat), regulatory history and current situation, anticipated industry reaction, cost/economics, safety/wholesomeness, detection, process control, eating quality and consumer acceptance. 77 references. SRA

Broilers

1042

Pandey (DS). **Modern scientific method of raising table broilers. Part IV.** *Poultry Guide* 29(1): 1992: 37-46

Duck

1043

Lesiow (T). **Influence of storage time of duck breast muscles at -18 C on rheological properties of gelled tissue and model sausage.** *Die Nahrung* 34(8): 1990: 747-758

The influence of storage time of duck breast muscles at -18 C on changes of rheological properties of gelled muscle tissue and a model sausage was studied for 200 days. Rheological parameters were determined by the TYSZKIEWICZ method and the modified SHAMA-SHERMAN method. On the basis of the calculations of rheological parameters it was found that the eight-element rheological model characterized best rheological properties of gelled muscle tissue and model sausage. The changes of rheological parameters of model sausage are more complex in comparison with rheological parameters of gelled muscle tissue. In both kinds of samples, the changes of rheological parameters are influenced by the changes occurring in myofibrillar proteins as a result of the so called frozen denaturation. It appears, that in the case of gelled muscle tissue it is possible to use exchangeably the TYSZKIEWICZ or SHAMA-SHERMAN method while for model sausage its rheological characteristics based on one of these methods exclusively would be insufficient. The changes occurring in rheological parameters of model sausage cannot be predicted according to the changes in rheological parameters of gelled muscle tissue. On the other hand, these changes are reflected in significantly different values of consistency of model sausage evaluated organoleptically. AS

1044

Lovett (J), Francis (DW), Peeler (JT) and Twedt (RM). **Quantitative comparison of two enrichment methods for isolating *Listeria monocytogenes* from seafoods.** *Journal of Food Protection* 54(1): 1991: 7-11

Two standard enrichment methods followed by the US Food and Drug Administration (FDA) and the US Dept. of Agriculture (USDA) were qualitatively compared for the isolation of *Listeria monocytogenes* from seafoods. With the FDA procedure, KOH culture treatment and enrichment for 24 h provided no advantage for *Listeria* recovery. The FDA procedure isolated heated *L. monocytogenes* from seafoods at a lower level than the USDA method; however, the two methods isolated unheated cells equally well. The greater selectivity of the USDA procedure may offer an advantage for isolating nonheat-stressed *Listeria* when the aerobic plate count of the product is high. BV

Clams

1045

Yellappa (N), Dora (KC), Chandrasekar (TC) and Udupa (KS). **Organoleptic evaluation of clam pickle with certain organic acids.** *Indian Journal of Nutrition and Dietetics* 28(2): 1991: 46-49

Acetic acid and lactic acid treated clam pickle did not show any difference in flavour and appearance; pickle treated with lactic acid had more eye appeal than acetic acid treated clam pickle. The pickle treated with tartaric acid was not appealing. GS

Shrimps

1046

Allen (G), Bruce (VR), Andrews (WH), Satchell (FB) and Stephenson (P). **Recovery of *Salmonella* from frozen shrimp. Evaluation of short-term selective enrichment, selective media, postenrichment and a rapid immunodiffusion method.** *Journal of Food Protection* 54(1): 1991: 22-27

Squids

1047

Yeh (A-I), Liang (JH) and Hwang (LS). **Separation of fatty acid esters from cholesterol in esterified natural and synthetic mixtures by supercritical**

carbon dioxide. *Journal of the American Oil Chemist's Society* 68(4): 1991: 224-229

Experimental results showed that cholesterol could be removed from a model mixture (made by adding cholesterol and fatty acid esters together) and from esterified squid visceral oil at low pressure (1500 psig) and high temp. (328.2 K). Under these conditions, cholesterol content in the extract was reduced from 2867 mg/100g to 14.1 mg/100g. BV

1048

Kuo (J-D), Hultin (HO), Peleg (M) and Atallah (MT). **Effects of heating and postmortem aging on physical properties of squid mantle.** *Journal of Food Processing Preservation* 15(2): 1991: 125-133

Physical and tensile properties of *Loligo* and *Illex* squid mantles were evaluated during refrigerated storage and after various heat treatments. A major decrease in ultimate tensile strength of the mantle occurred between 50 and 60 C in a direction parallel to the longitudinal axis of the mantle. After storage for more than 4 days at 4 C, the ultimate tensile strength of the mantle decreased significantly in the longitudinal but not the transverse direction. In addition, heating of mantle (100 C for 2 min) stored for more than 4 days led to greater strength loss than observed in heated, nonstored mantle, indicating that refrigerated storage produces changes in collagen that make it more susceptible to the effects of high temp. Strength loss in the transverse direction after heating was observed in mantle of *Loligo* but not *Illex*. AS

Fish

1049

Chand (BK), Otta (SK) and Das (SK). **Battered and breaded fishery products - a new attraction in modern food market.** *Seafood Export Journal* 23(9): 1991: 35-36, 38

The steps involved are portioning or forming where small pieces of fillets of fish are formed into portion of various stages and sizes by machine or manually, then it is battered with a paste of water, flour, salt and other flavourings. In breading the fish portions are dropped into a bed of dry crumbs in a breading machine and passed to a flash fryer (into a bath of hot oil) where products remain hot for more than 1 min. Then the product is refrozen before or after packing and stored 30 C. Equipments like forming machines, predusters, liquid enrobers and fryers are used. SRA

1050

Ghosh (S), Alur (MD) and Nerkar (DP). **Hydrolysis of fish protein by *Bacillus megaterium* cells immobilized in radiation induced polymerised wood.** *Journal of Food Science and Technology (India)* 29(2): 1992; 88-90

The immobilization of *Bacillus megaterium* cells in radiation-induced polymerized wood was studied for hydrolysis of trash fish protein. The optimum conditions and reaction kinetics for hydrolysis of protein by free and immobilized cells were found to be similar. Max. hydrolysis occurred at 50 C and at pH 7.5 with 15 to 20% (w/v) of immobilized matrix. The soluble content of the resultant hydrolysate was about 2.4% (w/v). AS

1051

Steiner-Aseidu (M), Asiedu (D) and Njaa (LR). **Effect of local processing methods (cooking, frying and smoking) on three fish species from Ghana. Part 2. Amino acids and protein quality.** *Food Chemistry* 41(2): 1991; 227-236

The effect of cooking, frying and smoking on *Sardinella* sp., *Dentex* sp. and *Tilapia* sp. indicated good quality protein as expressed by high apparent digestibility, true digestibility and net protein utilization and amino acid comp. Cooked fish was better absorbed than fried and smoked. SD

1052

Escobar (FA), Wells (JH) and Waikar (AM). **Simulation based performance analysis of crawfish processing operations.** *Journal of Food Process Engineering* 14(2): 1991; 147-162

A detailed model of crawfish processing operations was developed using the SLAM II simulation language. The simulation model was used to compare overall plant performance for two crawfish cooking schemes, boiling water and steam infusion, and to evaluate processing parameters for different plant capacities. For all the range of operating levels included in this study (2,400 - 19,000 lb of live crawfish/day or 360 - 2,900 lb of tail meat/day), the steam infusion cooking scheme rendered shorter processing times than those required by the boiling water cooking scheme. Moreover, the batch sizes and amount of resources used are smaller for the steam infusion cooking scheme. The simulation model is a valuable tool to analyze the performance of crawfish plants as well as to determine the impact of changes in technology on the overall process. AS

1053

Thibault (C) and Charbonneau (R). **Shelf-life extension of fillets of atlantic cod (*Gadus***

***morhua*) by treatment with ionizing rays. 1. Microbial flora evaluation.** *Sciences Des Aliments* 11(1): 1991; 1-16

Cod fillets frozen (-20 C) for 20 wks and thawed, and cod fillets (48 h post-mortem) are treated with doses ranging 1 - 5 kGy γ -rays and packed in polyethylene bags, with a min. of air. Ionisation of the thawed fillets (1 - 3 kGy) completely inhibits the microbial (*Micrococcus*) growth untill 7 days. In the fresh fillets, a dose of 4 kGy is needed to inhibit microbial (*Micrococcus*) growth at day 0, with a 10^4 level of contamination, while only 1 kGy is needed for thawed fillets with same level of contamination. It is concluded that a dose of 2 kGy allows an optimal increase of the fresh cod fillets shelf-life increasing in from 7 days for control samples to 14 days when treated and kept at 4 plus or minus 1 C. BV

Dhoma

1054

Shankar (TV), Ramachandran (A) and Solanki (KK). **Preparation and shelf-life of semi-dried fish cake from dhoma (*Otolithus* spp.).** *Journal of Food Science and Technology (India)* 29(2): 1992; 123-124

Semi-dried fish cakes from *Otolithus* spp. prepared at 7 and 10% soft levels were assessed chemically and microbiologically. The shelf-life for the two batches were 18 and 24 days respectively. High a_w and subsequent growth of fungi were found to be the reason for decreased shelf-life. AS

Tuna

1055

George (C) and Arul James (M). **Free amino acid composition of white and red meat of tuna (*Katzuwonus pelamis*).** *Seafood Export Journal* 23(9): 1991; 26-27

The free amino acid pattern of the white and red meat of *Katzuwonus pelamis* indicates that both contain all the amino acids. Histidine was in highest amount in both the muscles (162.90 in white and 234.24 in red muscle), followed by glycine, alanine, arginine, tyrosine, glutamic acid and serine in white muscle and arginine, serine, alanine, glycine and glutamic acid in decreasing order in red muscle. SRA

Yellow tail

1056

Berhimpon (S), Souness (RA), Driscoll (RH), Buckle (KA) and Edwards (RA). **Salting behaviour of yellow**

tail (*Trachurus mccullochi nichols*). *Journal of Food Processing Preservation* 15(2); 1991; 101-114

Low-fat yellow tail samples were wet salted in 5, 10, 15, 20% and saturated brine solutions at 25 and 35 C and later desalted. Salt content, moisture, water activity and rate of water transfer assessed showed that brine conc., fish shape and brine temp. had significant effect ($P < 0.01$) on equilibrium salt content and rate of salt uptake. Salt uptake of whole and split fish increase with brine conc. and moisture loss occurred in fish brined in 15 - 21% saturated brine. Rates of salt loss and salt uptake were similar in whole fish while in split fish rate of salt loss was faster than uptake. SD

Products

1057

Scott (KC) and Latshaw (JD). **Effects of commercial processing on fat-soluble vitamin content of menhaden fish oil.** *Journal of the American Oil Chemists Society* 68(4); 1991; 234-236

Vitamin E level decreased by about half as a result of processing (bleaching and refining). Bleaching the oil with Fuller's earth caused the major loss of retinols. Treating the fish oil with steam for several h caused the major loss of vitamin D₃. BV

PROTEIN FOODS

Infant foods

1058

Bhatt (SN), Shah (AG) and Rana (VA). **Microbiological status of infant foods.** *Journal of Food Science and Technology (India)* 29(2); 1992; 103-104

Microbial quality of infant food available in Gujarat market were found to contain fungi, particularly *Aspergillus*. BV

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

1059

Basarova (G). **The structure-function relationship of polymeric sorbents for colloid stabilization of beer.** *Food Microstructure* 9(3); 1990; 175-194

This review on the formation of non-biological haze in beer, deals on the mutual interactions of haze causing substances with precipitating, enzymatic and adsorptive stabilizers. Information on morphological, sorptive and filtering properties including structure is presented on new types of polymeric sorbents developed against beer polyphenols. SD

Hop

1060

Clark (DC), Wilde (PJ) and Wilson (DR). **The effect of pre-isomerised hop extract on the properties of model protein stabilised foams.** *Journal of the Institute of Brewing* 97(3); 1991; 169-172

A commercial sample of pre-isomerised hop iso- α acids was found to increase the stability of foams stabilized by bovine serum albumin or β -lactoglobulin as determined by a conductimetric technique under a var. of solution conditions. Suspended thin films containing hop iso- α acids were found to have drainage kinetics and equilibrium thicknesses distinct from control samples. The surface diffusion coeff. of fluorescent-labelled β -lactoglobulin in films partially destabilized by the presence of the non-ionic detergent, Tween 20 was found to be significantly decreased by the presence of hop iso- α acids. These findings support the hypothesis that hop acids stabilize foams by crosslinking surface adsorbed proteins. AS

1061

Kralj (D), Zupanec (J), Vasilj (D), Kralj (S) and Psenicnik (J). **Variability of essential oils of hops, *Humulus lupulus* L.** *Journal of the Institute of Brewing* 97(3); 1991; 197-206

A standard method for distinguishing the essential oils in hops has been developed. Factor, rotation-factor analyses have been used as well as correlation between gas chromatography and organoleptic estimation of aroma. A model for distinguishing 14 groups of oils using 31 descriptors has been developed utilizing the variability of components in essential oils. The results are valid for the oils from older established plants, picked at full maturity in Slovenia. AS

Lager

1062

Griffiths (NM). **Changes in flavour and metal content of lager during storage.** *Journal of the Institute of Brewing* 97(3); 1991; 173-179

Lager was commercially packed into glass bottles and two batches of both steel and aluminium cans. The flavour was evaluated by two sensory techniques and the iron and aluminium measured after 0, 1, 3, 4, 6, 9 and 12 months storage. The triangle difference tests showed no statistically significant difference in 23 out of the 26 tests. Similarly, no overall difference was found, due to pack or time, by quantitative descriptive analysis between any of the samples, canned or bottled. There was, however, a trend with storage time for the odour of all canned samples to increase in cabbage and decrease in fruity, buttery and aromatic attributes; the bottled lager did not show this trend. The iron content of the lager from all bottles, aluminium cans, and the 0, 1 and 3 month stored steel cans was generally less than 0.03 mg/l (the detection limit). From 4 months, the iron content of the lager from both batches of steel can varied markedly can to can and on av. increased; the concn. after 12 months storage varied from 0.03 to 1.43 mg/l. The amount of aluminium found in bottles and both types of can was always less than the detection level of 0.1 mg/l. AS

Wort

1063

Dale (CJ). **Applications of column chromatography to the analysis of brewing raw materials, wort and beer.** *Journal of the Institute of Brewing* 97(3): 1991: 187-195

The applications of column chromatographic methods of analysis to the investigation of the nitrogenous and carbohydrate constituents of brewing raw materials, wort and beer are reviewed. AS

Wines

1064

Correa-Gorospe (I), Polo (MC) and Hernandez (T). **Characterization of the proteic and the phenolic fraction in tartaric sediments from wines.** *Food Chemistry* 41(2): 1991: 135-146

Physico-chemical properties of organic compounds in sediments of wines were studied by electrophoretic, chromatographic techniques and chemical analysis. Phenolic compounds, consisting of cinnamic acids esterified with tartaric acid, were more abundant and highly polymerized in cold stabilized samples. The distribution of mol. wt. of properties of tartrates (50,000) differed from that of proteins in must and wines (20,000 - 40,000). SD

Non-alcoholic beverages

Coffee

1065

Patel (JR), Dave (RI), Joshi (NS) and Thakur (PN). **Coffee whiteners.** *Indian Dairymen* 44(1): 1992: 18-25

Coffee whiteners are used as substitute for fresh milk, in coffee, tea, cocoa or drinking chocolate, soups, sauces, puddings and cereal dishes. The role of each ingredient in the coffee whitener including protein, fat, sugar, emulsifier, stabilizer, buffer salts, flavours and colours have been described. Typical formulations for preparation of liquid and dried coffee whiteners as reported by various workers have been tabulated and the processing steps have been indicated. Whitening power and resistance to flaking are the two main properties of powder coffee whitener which have also been described. SRA

Fruit juices

1066

Dickmann (H). **Crossflow microfiltration system with backwash for the filtration of fruit juice and fruit wine.** *Fluessiges Obst* 56(9): 1989: 538-542 (De)

1067

Wallrauch (S). **Determination of nitrate in fruit juices using the cadmium sponge.** *Fluessiges Obst* 56(9): 1989: 574-576 (De)

Apple juices

1068

Stahle-Hamatschek (S). **Cloud composition and its influence on cloud stability in naturally cloudy apple juice.** *Fluessiges Obst* 56(9): 1989: 543-544, 550-558 (De)

Mango beverage

1069

Vineet Kaushik and Nirankar Nath. **Effect of cooking procedure and variety on acceptability of unripe mango beverage.** *Journal of Food Science and Technology (India)* 29(2): 1992: 127-129

Five cooking procedures were tried with 'Dushehari' var. Pressure cooking whole fruits under 15 psi steam pressure for 20 min, removing peels and stones manually, and passing through a blender

gave highest pulp yield (67.8%) without adversely affecting TSS and acidity of pulp, or sensory qualities of the beverage. Pulp yields for 'Deshi', 'Safeda' and 'Chousa' var. were 35.0, 64.8 and 68.4%, respectively. 'Dushehari' beverage was rated best, followed by 'Deshi', 'Safeda' and 'Chousa' beverages in that order. AS

Soft drinks

1070

Rother (H). **Determination of juice content in soft drinks.** *Fluessiges Obst* 56(9); 1989; 562-571 (De)

Tea

1071

Zakia Bano, Rajarathnam (S) and Mohanty (BD). **Somatic embryogenesis in cotyledon cultures of tea (*Thea sinensis* L.).** *Journal of Horticultural Science* 66(4); 1991; 465-470

A procedure to induce somatic embryos for cotyledons of tea seeds is described. Embryogenic culture was obtained from 70% of tender cotyledons (diam. 3-8 mm, with light brown and yellow seed coat) cultured on Murashige and Skoog's (MS) basal medium, supplemented with 2,4-D (0.5 mg l^{-1}) and kinetin (0.05 mg l^{-1}). A gradient of response to form embryogenic culture was obtained with maturity of the seeds (cotyledons). More large compact, bulged tissues of variable shapes and sizes were formed in embryogenic culture, when the 2,4-D concn. was increased in the medium. However, these tissues when cultured separately on a medium low in 2,4-D and kinetin, produced pro-embryonic cell masses and, eventually, plants. Masses of globular embryos formed in embryogenic culture; these retained their growth and morphogenic ability in a maintenance medium, and on transfer to a hormone-free or a medium containing kinetin ($0.05 \text{ } \mu\text{g l}^{-1}$) 30% matured to form heart to torpedo shaped embryos. Of these 40% readily germinated on half-strength MS medium supplemented with kinetin (0.05 mg l^{-1} , glucose 1.5%) and activated charcoal (0.2%) to form complete plants. Morpho-histological evidence suggests that somatic embryos developed directly from cotyledon cells. AS

1072

Qiu (ZS), Matsuura (T) and Chan (K). **Reverse osmosis concentration of green tea juice.** *Journal of Food Process Engineering* 14(2); 1991; 85-105

The reverse osmosis concn. of green tea juice was attempted by using membrane prepared from different polymeric materials. The pore sizes of the membranes were also changed in order to

investigate the effect of the pore size on the membrane performance. Special attention was focused on the removal of caffeine from the tea juice while retaining other components such as polyphenols and amino acids. Since severe membrane fouling was observed while tea juice was treated at high concn., an attempt was made to describe the membrane fouling by a modified gel model that includes the effect of the interaction between the membrane and the tea juice components. AS

FATS AND OILS

1073

Bariszlovich (M) and Meusel (DTulsnerM). **Characterization of microbial lipases. Part I. Determination of lipase activity.** *Die Nahrung* 34(8); 1990; 701-717 (De)

Review. 123 references. BV

Fats

1074

Gottstein (T) and Grosch (W). **Model study of different antioxidant properties of α - and γ -tocopherol in fats.** *FAT Science Technology* 92(4); 1990; 139-144

A model study using 2,2,5,7,8-pentamethyl-6-hydroxychroman (α -COH) and 2,2,7,8-tetramethyl-6-hydroxychroman (γ -COH) as antioxidants, and linoleic acid and its methyl ester (both in bulk phase) as lipids was performed. After having demonstrated that the antioxidative activities of the model substances did agree with those of the corresponding tocopherols (α -T, γ -T), the stability of α -COH and γ -COH was determined, and the products arising from α -COH, γ -COH, linoleic acid and its methyl ester were identified. α -COH did oxidize to different major products (quinone, trimer) depending on the reaction temp. (37 and 47 C) and the antioxidant concn., whereas the products obtained by oxidation of γ -COH (diphenyl ether dimer, biphenyl dimer) did not seem to be affected by differences in the reaction conditions. It was concluded that γ -T was superior to α -T antioxidant because it appears more stable and, also, being oxidized to compounds which are still effective as antioxidants. AS

Oils

1075

Nasirullah, Ankaiah (KN), Krishnamurthy (MN) and Nagaraja (KV). **Quality characteristics and**

stability studies on edible vegetable oil blends. *Journal of the Oil Technologists Association of India* 23(1); 1991; 10-12

Edible oil blends were prepared by mixing groundnut oil with rice bran oil (GR) and mustard oil with rice bran oil (MR) in the proportion 10:90, 30:70 and 40:60 (v/v) and stored in coloured glass bottles at room temp. for 3 yr and the physical and chemical characteristics were determined at regular intervals. In GR blend the iodine value decreased from 95 to 92.9, saponification value from 189 to 187.9. Whereas an increase was noted in butyrefractometer reading from 56.8 to 59.3, free fatty acid (FFA) % 0.6 to 2.1, peroxide value 0.4 to 54.8 and Kries colour value 2 to 40. In MR blend the change in values noted are iodine value 99.7 to 94.6, saponification value 182.72 to 181.6, butyrefractometer reading 58.5 to 60.5, FFA % 0.46 to 1.3, peroxide value 1.0 to 9.5 and Kries colour value 2 to 15 respectively. Silver nitrate precipitation and dinitrophenylhydrazine colour increased with storage time. MR blend was stable upto 2 yr, but strong rancidity developed in GR blend in 9 months. Cloud point and Bellies turbidity temp. test gave inconclusive results. SRA

1076

Sastry (CSP), Gopala Rao (S) and Sastry (BS). **Spectrophotometric determination of butylated hydroxy anisole (BHA) in oils.** *Journal of Food Science and Technology (India)* 29(2); 1992; 101-102

Two simple spectrophotometric methods were developed for the detn. of BHA in commercial samples and oils. The methods are based on the reaction of BHA to form coloured species with either of two reagents, Fe (III) - 2,4,6-tripyridyl-S-triazine or triphenyl tetrazolium chloride. AS

1077

Pokorny (J), Davidek (J), Vierecklova (M), Ranny (M) and Sedlacek (J). **Effect of phosphorylated acylglycerols on the oxidative stability of edible oils.** *Die Nahrung* 34(8); 1990; 719-725

Phosphorylated acylglycerols and their salts containing nitrogen inhibit the autoxidation of rapeseed, soybean, sunflower seed, and hydrogenated rapeseed oils similarly as natural soybean or rapeseed phospholipid conc. (lecithins). The activity is moderate at low concn. levels (0.02 - 0.10%) but well pronounced at higher levels (0.5 - 2.0%), the protection factor being proportional to the concn. of phospholipids. Ammonium salts are more active than lysine and arginine salts which are more active than free phosphatidic acids. Zinc salts have only very low activity, and calcium and sodium salts are inefficient. The activity depends on the quality

of oils, and in lesser degree, on the composition of phospholipids. AS

Canola oil

1078

Przybylski (R) and Eskin (NAM). **Phospholipid composition of canola oils during the early stages of processing as measured by TLC with flame ionization detector.** *Journal of the American Oil Chemist's Society* 68(4); 1991; 241-245

Canola oils at initial stages of processing from different crushing plants were analyzed for phosphatides. The major phospholipid components identified and quantified in refined canola oils were phosphatidic acid and phosphatidylinositol. Phosphatidic acid was the main P component identified in solvent extracted canola oil samples. The two-dimensional separation that was used combined classical TLC with quantitation on chromarods in an Iatroscan with a flame ionization detector. Phosphatides quantitated with this procedure ranged from 0.1 to 20 µg with a coeff. of variation of 4.4 to 7.2%. Using the modified procedure, recoveries of better than 90% were obtained for all phospholipids analyzed. AS

Coconut oils

1079

Barrios (VA), Olmos (DA), Noyola (RA) and Lopez-Munguia (CA). **Optimization of an enzymatic process for coconut oil extraction.** *Oleagineux* 45(1); 1990; 35-42

Mustard oils

1080

Vajreswari (A), Srinivasa Rao (P) and Tulpule (PG). **Short-term effects of low erucic acid rapeseed oil and high erucic acid mustard oil on myocardial lipidosis of CFY strain of rats.** *Journal of the Oil Technologists Association of India* 23(1); 1991; 2-5

Rats of CFY strain were fed diets containing 20% groundnut oil, 20% low erucic acid rapeseed oil or 20% high erucic acid mustard oil for 3 days/one wk. Feeding low erucic acid rapeseed oil did not induce growth retardation and fatty infiltration of heart. Further from the presence of erucic acid containing triglycerides in the mustard oil-fed rat hearts and oleic acid rich triglycerides in the myocardium of low erucic acid rapeseed oil-fed rats suggests that dietary monounsaturated fatty acids got accumulated in this fraction. Studies on the development of myocardial of mustard oil fed rats showed remarkable growth retardation, and

significant accumulation of triglycerides and cholesterol, causing myocardial lipidosis. The myocardial lipid profiles of the low erucic acid fed rats were similar to that of groundnut oil fed rats. Mobilization of lipids from the hearts of mustard oil fed animals started after seven days of feeding, which is more apparent in the female rats. It is concluded that the low erucic acid rapeseed oil may not be harmful, when used for short duration, but prolonged feeding may lead to deleterious effects which are of milder degree as compared to conventional high erucic acid containing rapeseed or mustard oils. SRA

1081

Handoo (SK), Gupta (DK), Gupta (S) and Agrawal (TN). **Effect of allyl isothiocyanate content on the hydrogenation of mustard oil.** *Journal of the Oil Technologists Association of India* 23(1); 1991: 13-16

This study was conducted to find out the optimum level of allyl isothiocyanate (AITC) in mustard oil which does not affect the course of hydrogenation. Mustard oil containing 39.9% erucic acid and 0.32% AITC was refined, bleached and deodorised for 6 h drawing the sample at 1 h interval to get oil having different isothiocyanate content. Oils with different isothiocyanate levels were hydrogenated in the lab. autoclave at 180 - 190 C and 30 psig hydrogen pressure for 4 h using 0.2% Ni as catalyst. During hydrogenation samples were analysed for m.p., iodine value (IV), and fatty acid composition. The graphs of m.p. vs time of hydrogenation and IV vs hydrogenation indicate the progress of hydrogenation at different levels of isothiocyanate. Melting point vs time plots for mustard oils with different AITC content were linear. With decrease in AITC content of oils, m.p. increased for a particular time of hydrogenation. Similar trend was observed for IV drop. When the AITC decreased from 0.247 to 0.081% significantly lowering dehydrogenation time was recorded. At AITC level of 0.208% corresponding to 1 h of deodorization, the m.p. after 3 h of hydrogenation was 37.6 C which is acceptable m.p. of vanaspathi. It is inferred from the above data that the tolerance limit of AITC in mustard oil is 0.18 - 0.20% assuming normal hydrogenation time of 3 to 4 h. The fatty acid composition of all the hydrogenated oils at various stages of hydrogenation revealed that the conversion of linolenic acid to linoleic acid and oleic increases with the decrease in AITC content. SRA

Soybean oils

1082

Nieh (CD) and Snyder (HE). **Solvent extraction of oil from soybean flour. I. Extraction rate, a countercurrent extraction system, and oil**

quality. *Journal of the American Oil Chemists Society* 68(4): 1991: 246-249

Rates of oil extraction from either fine flour or soybean flakes in a column showed that oil extraction from flour was dependent on the vol. of solvent, but oil extraction from flakes depended on time of contact rather than vol. of solvent. Fine full-fat flour worked well in a batchwise countercurrent extraction system with mixing and centrifugal separation. The oil resulting from this countercurrent extraction system had a superior quality with 37 p.p.m. P, 0.08% free fatty acids, and a light colour. BV

1083

Nieh (CD) and Snyder (HE). **Solvent extraction of oil from soybean flour. II. Pilot plant and two solvent extractions.** *Journal of the American Oil Chemists Society* 68(4): 1991: 250-253

The process of grinding soybeans to a fine flour and extracting the flour with hexane was studied on a pilot plant scale. The crude oil from the pilot plant study had 15 p.p.m. P and was suitable for physical refining after a light acid pretreatment and bleaching. The refined oil showed a Lovibond colour of 1.4 yellow and 0.3 red. The pilot plant study also showed that grinding of the soybeans and the separation of solid from miscella were the most difficult steps in solvent extraction with fine flour. A lab. study on separation of miscella from meal by aqueous ethanol reduced the hold-up vol., but it did not remove all the miscella. A test with β -carotene showed that only the miscella outside the flour particles was displaced. Aqueous ethanol solutions used as a second solvent extracted additional nontriglyceride material (primarily phospholipids) from the meal. Also, the free fatty acid content of the oil was increased with aqueous ethanol solution wash. The quality of the extracted crude oil was lowered by using a second solvent, but it had the advantage of needing only one centrifugation to separate miscella from meal. AS

Sunflower oils

1084

Mittelbach (M) and Trathnigg (B). **Kinetics of alkaline catalyzed methanolysis of sunflower oil.** *FAT Science Technology* 92(4): 1990: 145-148

The kinetics of methanolysis of sunflower oil with KOH as catalyst was investigated. The content of triglycerides, the resulting methyl esters as well as diglycerides and monoglycerides was analyzed at different times at molar ratios of methanol:sunflower oil = 3:1 and 3.3:1. At a molar ratio of 3:1 the kinetic order appears to be second

order in the first minutes, but then the reaction rate decreases rapidly due to the formation of glycerine as a second phase, which leads to a loss of methanol and catalyst. The effect of temp., amount of catalyst and type of vegetable oil formation of methyl esters was examined. AS

SPICES AND CONDIMENTS

1085

Yavas (I) and Rapp (A). **Gas-chromatographical/mass-spectrometrical investigations into the flavouring substances of raki.** *Deutsche Lebensmittel-Rundschau* 87(2); 1991; 41-45 (De)

Flavouring concn. of raki products (aniseed-flavoured liquors) produced through liquid/liquid extraction with trichlorofluoro-methane could be separated on polar and apolar capillary separating columns into numerous components. The different products (yeni, altinbas, kulup) showed similar flavouring patterns varying only in quantitative composition. Tests by means of GC/MS enabled us to identify more than 60 components. Besides typical components of the anise seed (*Pimpinella anisum*), numerous characteristic components of the raw spirits used in manufacture, made from fermented raisins or grapes was also found. AS

Spices

Basil

1086

Baritoux (O), Amiot (M-J), Richard (H) and Nicolas (J). **Enzymatic browning of basil (*Ocimum basilicum* L.). Studies on phenolic compounds and polyphenol oxidase.** *Sciences Des Aliments* 11(1); 1991; 49-62

Cardamom

1087

Raghavan (B), Abraham (KO), Shankaracharya (NB) and Shankaranarayana (ML). **Cardamom - Studies on quality of volatile oil and product development.** *Indian Spices* 28(3); 1991; 20-24

The review covers improving the quality of cardamom volatile oil by fraction collection during steam distillation, column chromatography, solvent partition and adduct formation, preparation of stable cardamom flavour in powder form by encapsulation; and application of cardamom flavour

in sugar-cardamom mix, cardamom cola, cardamom chocolate, custard dessert and cardamom-flavoured coffee and tea. GS

Kalazira

1088

Thappa (RK), Ghosh (S) and Agarwal (SG). **Comparitive studies on the major volatiles of kalazira (*Bunium persicum* seed) of wild and cultivated sources.** *Food Chemistry* 41(2); 1991; 129-134

Oil from cultivated kalazira (spice) seed was found superior with higher content of aldehydes, lower content of terpene hydrocarbons (γ -terpene and p-cymene), richer cuminaldehyde (27.3 - 34.1%); p-mentha-1,3-dien-7-al and p-mentha-1,4-dien-7-al (29.6 - 36.8%) than oil from wild source with more γ -terpene (25.6 - 42.9%) and p-cymene (24.0 - 27.8%) and less aldehydes similar to oil obtained from immature seeds of cultivated source. Yield of seeds can be increased four times than the wild source and straw itself contained 1.20% good quality oil. SD

Mango ginger

1089

Srinivasan (MR) and Chandrasekhara (N). **Effect of mango ginger (*Curcuma amada* Roxb.) on lipid status in normal and hypertriglyceridemic rats.** *Journal of Food Science and Technology (India)* 29(2); 1992; 130-132

When 10% mango ginger or a comparable level of 10 mg % curcumin was fed with a normal diet or with a sucrose based hypertriglyceridemic diet to adult female albino rats, significant decreases were observed in liver and serum triglycerides. Both mango ginger and curcumin caused significant decreases in liver total lipids and free fatty acids in rats on the normal diet and in liver wt. and serum total lipids in rats on the hypertriglyceridemic diet. The curcumin-free lipid fraction from mango ginger when fed at 0.3% level (comparable to 10% mango ginger) with either diet similarly decreased the liver triglycerides on both diets, but the liver wt., serum total lipids and triglycerides were decreased only in rats on the hypertriglyceridemic diet. Mango ginger, curcumin or the curcumin-free lipid fraction did not affect fat absorption. AS

Pepper

1090

Suseelappan (MS). **Medicinal uses of pepper in ayurveda.** *Indian Spices* 28(3); 1991; 25-26

Poppy seed

1091

Meshehdani (T), Pokorny (J), Davidek (J) and Panek (J). **Effect of lipoxygenases on the lipid oxidation during the storage of poppy seed (*Papaver somniferum* L.).** *Die Nahrung* 34(8); 1990; 769-772

Poppyseed contains nearly 50% lipids, 65 - 73% of their fatty acids consist of linoleic acid, contributing to high nutritional value of poppyseed. Therefore, the content of linoleic acid containing triglycerides is also high. Poppyseed easily turns bitter on storage, and attributed the bitter taste to the presence of free linoleic acid liberated from triglycerides by lipases; the bitter taste of linoleic acid at the 1.0% level was confirmed in oil solutions. Other researchers reported on the bitter taste of linoleic acid oxidation products, particularly various hydroxylic and dihydroxylic derivatives, which taste bitter even in oil solutions. The oxidation of poppyseed lipids proceeds rather quickly on storage, especially in seeds which are damaged in higher degree due to harvest by combine type threshers. For this reason poppyseed lipoxygenases, which are released from damaged cells and come in contact with linoleic-acid containing lipids on storage of damaged seeds is studied. AS

1092

Meshehdani (T), Pokorny (J), Panek (J) and Davidek (J). **Oxidation of free lipids in stored poppy seed (*Papaver somniferum* L.).** *Die Nahrung* 34(8); 1990; 773-774

SENSORY EVALUATION

1093

Stone (H), McDermott (BJ) and Sidel (JL). **The importance of sensory analysis for the evaluation of quality.** *Food Technology* 45(6); 1991; 88, 90, 92-95

This article outlines the differences between the consumers and producers on the product quality, the meaning of the word 'quality' as understood by the consumers, standardization of quality perception through testing and discusses about the model for sensory quality for the detn. of product quality. CSA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

1094

Maris (P). **Virucidal activity of disinfectants on bacteriophages contaminating inert surfaces.** *Sciences Des Aliments* 11(1); 1991; 17-24 (Fr)

A simple method for ascertaining the effect of disinfectants in the food industry on bacteriophages contaminating inert surfaces is presented. The virucidal concn. were 1 - 5 times higher than the concn. obtained by the quantitative suspension test NF-T-72-181 in 8 commercial compounds and 3 reference products tested. In the presence of milk, the active concn. were 4 - 32 times, even more than 80 times higher than the usually recommended doses. BV

BIOCHEMISTRY AND NUTRITION

1095

Murthy (NK) and Varalakshmi (S). **Biochemical and functional consequences of riboflavin deficiency among school children in Coimbatore and the effect of riboflavin supplementation.** *Indian Journal of Nutrition and Dietetics* 28(1); 1991; 1-5

The impact of riboflavin supplementation on the growth, red cell riboflavin and arm-hand steadiness of school girls aged 9 to 10 yr. was studied. Each girl was supplemented with riboflavin tablet of 10 mg daily. The supplementation was done for a period of 60 days. Riboflavin supplementation had no impact on blood iron and haemoglobin, anthropometry and urinary hydroxyproline. Arm-hand steadiness improved with the supplementation. GS

1096

Paul (SC) and Mathur (BN). **Nutritional requirements of infants having lactose deficiency - a review.** *Indian Journal of Nutrition and Dietetics* 28(2); 1991; 50-62

A review of nutritonal requirement of the lactose intolerant infants including energy, protein, fat, carbohydrate, minerals, vitamins and growth stimulating and protective factors which form the nutritional components of the infant nutrition. Ca and P ratio, Na and K ratio and the Fe requirement in the diet of lactose intolerant infants has also been indicated and it has been concluded that the nutritional requirement of lactose intolerant infants are slightly higher than that of normal infants. GS

1097

Banerjee (S). **Nutritional status of students and calorie requirements.** *Science and Culture* 57(5/6); 1991; 114-119

The study covers the results of dietary surveys conducted in 13 hostels in Calcutta, nutritional status of students of the Presidency College residing in the Eden Hindu Hostel, food intake of adolescent college girls of Rajasthan; food intake of medical college male students of Rajasthan; calorie requirements, body surface area; respiratory quotient; basal metabolic rate in Indians; and energy intake and expenditure of hostelmates of the above colleges. GS

1098

Fukushima (D). **Structures of plant storage proteins and their functions.** *Food Reviews International* 7(3); 1991; 353-381

The importance of the complete amino acid sequence on the molecule of cereal and legume seed storage proteins in a new food development; the biosynthesis and complete amino acid sequence of these storage proteins; the existence of a common structural feature among the major storage proteins of legumes, rice, rapeseed and sesame, which seem to be unrelated, suggesting that these proteins could be related to a common ancestral gene; the

mechanisms of some functionalities of plant storage proteins at the molecular level, such as gel formation of soybean proteins and a visco-elasticity of wheat gluten; and genetic improvement of plant storage proteins are the aspects covered in this review. 65 references. SRA

1099

Inglett (GE) and Grisamore (SB). **Maltodextrin fat substitute lowers cholesterol.** *Food Technology* 45(6); 1991; 104

A brief report on oatrim, a maltodextrin made from oats and which acts as a fat substitute with the ability to lower blood cholesterol level. Preparation, properties, applications and commercial status of oatrim are discussed. CSA

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1100

Roser (B). **Trehalose, a new approach to premium dried foods.** *Trends in Food Science and Technology* 2(7): 1991: 166-169

The simple but unusual sugar trehalose has the remarkable ability to completely protect cryptobiotic plants and animals from damage caused by desiccation, can be applied on an industrial scale to the drying of foods. Although the use of trehalose is presently restricted to the drying of foods that are liquid or pureed, current research indicates that its use can be successfully extended to sliced foods, with only minor modifications of technique. This bland, non-toxic sugar forms a glass during drying that entraps volatile food aromatics; these are released when the dried product is reconstituted with water. Aspects covered in this review are: trehalose and cryptobiosis, trehalose-dried foods, preservation of food volatiles, mechanism of action (hydrogen bonding, glass formation and chemical stability) and nutritional characteristics. 21 references. BV

FOOD PROCESSING

Nil

FOOD PACKAGING

1101

Robertson (GL). **Predicting the shelf-life of packaged foods.** *ASEAN Food Journal* 6(2): 1991: 43-51

This article reviews aspects on factors controlling shelf-life (product characteristics, distribution environment, package properties), and accelerated shelf-life testing (basic principles, ASLT procedures and problems in the use of ASLT conditions). 21 references. SRA

Packaging materials

1102

Letinski (J) and Halek (GW). **Interactions of citrus flavour compounds with polypropylene films of varying crystallinities.** *Journal of Food Science* 57(2): 1992: 481-484

Equilibrium sorption levels at 23 C were determined individually for two citrus flavour components

(d-limonene and l-carvone) into ground and unground polypropylene films of different crystallinities. Sorption levels at equilibrium were also determined for a mixture of the two flavour compounds. Aqueous solutions of the flavour compounds (200 p.p.m. carvone and 100 p.p.m. limonene) were employed. Conc'n. of flavours remaining in solution before and after exposure were measured by HPLC. Results indicated flavour compound polarity, polymer crystallinity and the presence of other flavour compounds in a mixture influenced sorption behaviour. AS

1103

Nielsen (TJ), Jagerstad (IM), Oste (RE) and Wesslen (BO). **Comparative absorption of low molecular aroma compounds into commonly used food packaging polymer films.** *Journal of Food Science* 57(2): 1992: 490-492

Five polymer films commonly used in food packages were stored in an aqueous solution of 10 apple aroma compounds. Substances absorbed by the polymers were determined by a supercritical fluid extraction/GC method. Polypropylene absorbed most aromas, more than 2 x amounts absorbed by low density polyethylene. Polyamide and polyester absorbed very small amounts of the aromas. Esters and aldehydes were absorbed much more than alcohols. Mol. size also affected absorption, larger molecules being absorbed to a greater extent than smaller ones. For most materials the absorption equilibrium was reached within a wk. AS

FOOD ENGINEERING AND EQUIPMENT

1104

Caro (RH) and Morgan (WE). **Trends in process control and instrumentation.** *Food Technology* 45(7): 1991: 62, 64-66

This article attempts to explore some recent technological advances in instrumentation and control with potential applications in food processing. Factors hindering implementation, progress in other industries, developments in control technology, driving forces for improvements, trends in instrumentation and control, keys to the future and the improved food process control are dealt. CSA

1105

Hartman (TG), Overton (SV), Manura (JJ), Baker (CW) and Manos (JN). **Short path thermal desorption. Food science applications.** *Food Technology* 45(7): 1991: 104-105

The functions of the short path thermal desorption system which provides analysis of volatile and semivolatile components in foods and packaging materials have been discussed in this article. The applications of this technique in food analysis and other areas are dealt. CSA

1106

Matthiesen (A), McIntyre (F) and Ibar (JP). **Thermal analysis spectrometer characterizes food properties.** *Food Technology* 45(7): 1991: 106-107

The experiments performed using a thermally stimulated current/relaxation map analysis (TSC/RMA) spectrometer designed for ease of use, flexibility of sample handling and high sensitivity has been discussed. The current applications of TSC/RMA spectrometer is that it provides improved sensitivity for many product development and quality control applications. CSA

1107

Djelveh (G), Malgorn (Y) and Gros (JB). **Component flows and interactions in agar gels predicted by linear irreversible thermodynamics.** *Journal of Food Science* 57(2): 1992: 449-453, 489

Equations derived from the linear irreversible thermodynamics showed direct relationships between flow, pressure and chemical potential gradients. To predict flows, three coeff. (hydraulic permeability, solute permeability, and reflection coeff.) were introduced into the equations and measured experimentally for counter-current transfer of water and salt in agar gels. The reflection coeff. was less than 0.0003 indicating that the gel behaved as a non-selective membrane. To analyse the interactions, three interaction coeff., for solute and water, solute and polymer network and water and polymer network were used, and expressed as a function of the former coeff. Results showed that only salt and water interactions controlled the rate of transfer. AS

1108

Sakai (N) and Hayakawa (K-I). **Two dimensional simultaneous heat and moisture transfer in composite food.** *Journal of Food Science* 57(2): 1992: 475-480

A computerized method was developed to predict two dimensional, simultaneous heat and moisture transfer in a composite food with chemical reactions, based on the use of the chemical potential as the mass transfer potential. Thermodynamically interactive heat and mass fluxes were included in the mathematical model. Composite cylindrical samples in 3 layers prepared from a high amylose starch granule hydrate and a mixture of the same

dhydrate and sucrose were dried in a forced air dryer to experimentally verify values predicted by the computerized method. The central temp. and av. moisture contents of the samples determined experimentally, agreed well with those predicted theoretically. AS

1109

Campbell (S) and Ramaswamy (HS). **Heating rate, lethality and cold spot location in air-entrapped retort pouches during over-pressure processing.** *Journal of Food Science* 57(2): 1992: 485-489

The effects of entrapped air on the heating rate, lethality and cold spot in bricks packaged in retort pouches were determined using silicone rubber bricks (10 x 14.5 x 2 cm), with 5 thermocouples positioned from the geometric center-point to near the top surface. The packaged bricks were processed in steam/air media at two temp. (121.1 C and 115.6 C) and two levels of superimposed air over-pressure (corresponding to 65% and 75% steam). With the exception of the highest level of over-pressure, (121.1 C, 65% steam content), entrapped air volumes > 20 mL reduced heating rates and lethality, and shifted the cold spot from the geometric center. At 60 mL of entrapped air the point of least lethality was near the brick surface. AS

1110

Bakhit (RM) and Schmidt (SJ). **Sorption behaviour of mechanically mixed and freeze-dried NaCl/casein mixtures.** *Journal of Food Science* 57(2): 1992: 493-496, 502

Adsorption isotherms of mechanically mixed and freeze-dried mixtures of NaCl/casein at solute percentages of 1, 5, 10, 15 and 20 (wet basis) were obtained over the a_w range 0.23 - 0.927 at 20 C. Experimental isotherm values were compared to those calculated by a mass balance equation. The mechanically mixed samples sorbed additively as predicted by the mass balance equation below 0.755 a_w , whereas the freeze-dried mixtures sorbed more water than predicted (positive interaction) below 0.755 a_w . Both types of mixtures sorbed less water than predicted by the mass balance equation (negative interaction above the saturation a_w of the NaCl, 0.755. AS

1111

Yang (BB) and Swartzel (KR). **Particle residence time distributions in two-phase flow in straight round conduit.** *Journal of Food Science* 57(2): 1992: 497-502

Residence times were studied for single particles (polystyrene spheres 19.1 mm diam.) in the straight

portion of the holding section of a continuous flow system. Particle residence times were all less than the mean residence time of fluid; their ranges were within particle-to-fluid residence time ratios of 0.8 to 1.0. The velocities of the fastest moving particles were all about 1.25 times the mean fluid velocity in the turbulent flow regime. Particle density was important in the flow patterns of two-phase flow. The effect of particle-to-fluid density ratios on the particle residence time followed a quadratic function where particles with density ratio of 1.01 had the least residence time. AS

1112

Onwulata (CI), Mulvaney (SJ), Hsieh (F) and Heymann (H). **Step changes in screw speed affect extrusion temperature and pressure and extrudate characteristics.** *Journal of Food Science* 57(2); 1992: 512-515

A first order lag with time delay was used to model dynamic responses of product temp., torque, and mass pressure to step changes in screw speed. Transportation lag was evident in the mass temp. at the die, while the time constants generally decreased with increased magnitude to the step input. Dynamic responses indicated a more stable response to larger magnitude of step inputs. Product attributes and process variables were shown to be a function of the magnitude of the step input when final screw speed set points were identical. AS

1113

Wicker (L). **Selective extraction of thermostable pectinesterase.** *Journal of Food Science* 57(2); 1992: 534-535

Thermostable pectinesterase was estimated to represent 98% of total activity extracted from Marsh grapefruit pulp by 1M NaCl without pH adjustment or 17% when extracted with 1M NaCl, 0.25M Tris-Cl⁻, pH 8.0. Total units of pectinesterase solubilized were less in 1M NaCl at endogenous pH values than at pH 8.0, but total thermostable pectinesterase units remained constant. No conversion of thermostable to heat sensitive isoenzymes was observed. Preparative isoelectric focusing indicated that most activity focused at alkaline pH values. The constant specific activity suggested co-migration of basic proteins. AS

1114

Jackson (LS) and Lee (K). **Microencapsulation and the food industry.** *Lebensmittel-Wissenschaft und -Technologie* 24(4); 1991: 289-297

This article reviews properties of microcapsules, uses for microencapsulation (acids, lipids, enzymes,

microorganisms, flavours, artificial sweeteners, gases, vitamins and minerals), microencapsulation techniques (spray drying, spray chilling and spray cooling, extrusion, air suspension coating, multi-orifice centrifugal extrusion, coacervation/phase separation, liposome entrapment, inclusion complexation, co-crystallization and interfacial polymerization). 74 references. BV

1115

Schmidt (B) and Dirksen (J). **Recent advances in conveyor lubrication.** *Technical Quarterly, Master Brewers Association of America* 28(1); 1991: 1-3

This paper discusses the changing needs of the brewer, and how advances in conveyor lubricant formulation and application technology. Covers improved lubrication for high-speed conveyors, elimination of soil on conveyor, control of microorganisms, foam control, prevention of nozzle plugging, improved storage and handling, cost control and effluent control. BV

Equipments

1116

Yazbak (G). **Fiberoptic sensors solve measurement problems.** *Food Technology* 45(7); 1991: 76-78

The working of miniature fiberoptic silicon sensors which has resulted in the development of a new measurement technology for the food industry is discussed. The new technology can be used to measure temp., pressure and refractive index which results in superior product quality and lower operating costs. CSA

1117

Jackman (M). **In-line viscometers help achieve perfect products.** *Food Technology* 45(7); 1991: 90-91, 96

This article presents an overview of the rheology of foods, the types of in-line viscometers (coaxial cylinder, pressure drop, vibrating rod) that are available and gives several practical examples of their applications. CSA

1118

Anon. **Instruments for measuring viscosity and flow.** *Food Technology* 45(7); 1991: 92-96

Viscometers and rheometers suited for laboratory or in-line use such as portable viscometer, programmable rheometer, in-line viscosity

transmitter, process viscometer, direct-reading viscometers, rheological properties, viscosity-measurement systems, viscoelasticity analyzer, information, fluids analyzer, dual detector and in-line viscometer are featured in this article. CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1119

Ukhun (ME) and Dible (EN). **The ascorbic acid content of selected marketed foods and influence of water activity (a_w) during storage.** *Food Chemistry* 41(3); 1991: 277-283

Ascorbic acid levels were 0 - 184 mg/100g in foods, 184.6 plus or minus 20.7 in whole guava fruit, 138.4 - 155.2 in fresh palm wine, 86.8 plus or minus 10.5 in whole red pepper, 70.3 plus or minus 92.6 in commercial palm wine, 44.4 plus or minus 4.2 in cashew apple juice and 42.3 plus or minus 4.6 in ripe pawpaw. Losses between 12 - 83% of ascorbic acid after 4 and 8 wks of storage of garri and cassava were noticed. Increase a_w , resulted in increasing storage losses of vitamins. Generally most of the foods were a good source of ascorbic acid. SD

1120

Anjan Reddy (K) and Marth (EH). **Reducing the sodium content of foods: A review.** *Journal of Food Protection* 54(2); 1991: 138-150

This review article discusses the role of salt in some foods, role of sodium salts other than sodium chloride in foods, physiological role of dietary sodium chloride, sodium and hypertension, salt substitutes and reduction of sodium in dairy products. 168 references. BV

1121

Chauhan (SA), Bhatt (AM), Bhatt (MP) and Majeethia (KM). **Stability of iodised salt with respect to iodine content.** *Research and Industry, India* 37(1); 1992: 38-41

Iodised salt was either stored in packed polythene (HDPE) bags for about 10 months or kept in open heaps. Potassium iodate is found to be stable as it is not lost even after 300 days storage in open or

packaged condition. Iodised salt when heated (300 - 500 C/h³) or boiled, lost only 4 to 11% of iodine which is negligible. GS

Chemistry (Analytical)

1122

Zapata (S) and Dufour (J-P). **Ascorbic, dehydroascorbic and isoascorbic acid simultaneous determinations by reverse phase ion interaction HPLC.** *Journal of Food Science* 57(2); 1992: 506-511

Detection was by UV absorbance (after pre-column derivatization of dehydroascorbic acid with 1,2-phenylenediamine). When absent, isoascorbic acid could be used as internal standard. Isocratic separation was accomplished in 11 min using the eluent, methanol-water (5:95, v/v) containing potassium dihydrogen phosphate (50 mM) and the counter ion hexadecyltrimethylammonium bromide (5 mM). Sample preparation steps using Sep-pak C18 cartridge were minimal. Ten p.p.m. could be detected for each compound with good reproducibility (c.v. < 2%). The method was used to determine vitamin C content in selected foods and beverages. AS

1123

Barge (MT), Destefanis (G), Toscano (GP) and Brugiapaglia (A). **Two reading techniques of the filter paper press method for measuring meat water-holding capacity.** *Meat Science* 29(2); 1991: 183-189

1124

Sen (A), Schieberle (P) and Grosch (W). **Quantitative determination of 2,5-dimethyl-4-hydroxy 3(2H)-furanone and its methyl ether using a stable isotope dilution assay.** *Lebensmittel-Wissenschaft und -Technologie* 24(4); 1991: 364-369

A stable isotope dilution assay has been developed for the quantitative detn. of 2,5-dimethyl-4-hydroxy-3(2H)-furanone (DHF) and its methyl ether in fresh and processed fruits. Application of the method to strawberries (fresh fruits, juice, jam, candies), pineapples (juice, jam) and blackberries has indicated that both compounds can be determined with a high degree of sensitivity and accuracy. Analysis of a strawberry suspension treated with β -glucosidase at pH 6.8 showed a 3.5-fold increase of the DHF level. AS

1125

Samarajeewa (U), Wei (CI), Huang (TS) and Marshall (MR). **Application of immunoassay in the food industry.** *CRC Critical Reviews in Food Science and Nutrition* 29(6): 1991: 403-434

This review covers immunoassay techniques and application in the food industry for detecting the naturally occurring food constituents (flavour constituents, undesirable compounds occurring naturally in foods, nutritionally important constituents), food production and processing, (plant growth substances, estimation of food constituents that provide processing characteristics, spoilage of foods and food crops, food processing), food safety (pathogenic microorganisms and their toxins, pesticides, anabolic agents, therapeutic agents, adulterants, immunodiagnostic kits and future prospects). 377 references. SRA

Bacteria

Lactobacillus

1126

Wolf (G), Strahl (A), Meisel (J) and Hammes (WP). **Heme-dependent catalase activity of lactobacilli.** *International Journal of Food Microbiology* 12(2/3): 1991: 133-140

The heme-dependent catalase in *Lactobacillus pentosus*, *L. sake*, *L. delbrueckii* and *Enterococcus faecalis* was studied. The catalase was formed by cells grown aerobically in the presence of hematin or for lactobacilli when grown without added hematin, after incubation of buffered cells in the presence of hematin. The kinetics of the production of catalase revealed max. activity for *L. pentosus* and *E. faecalis* at late stationary and late logarithmic growth phase, resp. The physiological role of catalase was studied with *L. sake*. The presence of hematin allows higher growth yields, since it protects the cells against hydrogen peroxide formed endogenously up to concn. of 4.6 mmol/l. AS

Listeria

1127

Siragusa (GR) and Nielsen (JW). **A modified microtiter plate method for biochemical characterisation of *Listeria* spp.** *Journal of Food Protection* 54(2): 1991: 121-123, 130

A microtiter plate format previously reported for the biochemical characterisation of microorganisms was modified by adding agar to all of the different test media instead of using a combination of liquid and solid media. This modification, termed the Modified Microtiter Plate procedure (MMP), offered the same advantages of the original method (labor saving, inexpensive and custom designed for special needs) as well as having the added advantages of longer term storage prior to use and ease of handling. In this study, 60 bacterial isolates (both *Listeria* suspects and known *Listeria* cultures) were biotyped using the MMP protocol and compared to results obtained using the classical tube-based US-FDA recommended protocol as the standard identification method and the BBL-Minitex system. AS

Pseudomonas

1128

Harris (PL) and Cuppett (SL). **Effect of selected antioxidant on the activity of a mixture of crude *Pseudomonas* lipases.** *Journal of Food Protection* 54(2): 1991: 133-135

Commercially acceptable concn. (0.02%) of BHT, BHA, TBHQ, Tenox 4, and Tenox 8 were evaluated for their effect on the lipolytic activity of mixed *Pseudomonas* crude lipases (MCLs). MCLs were prepared from lipases produced by raw milk isolates of *Pseudomonas fluorescens*, *P. cepacia* and *P. putida*. GRAS antioxidants, 1-ascorbyl 6-palmitate (AP) and d- α -tocopherol (AT), at 0.5, 1.0 and 2.0% concn., were also evaluated for their effect on lipase activity. Antioxidants and enzyme preparations were incubated for 30 min at 25 or 40 C. At 25 C, all antioxidants tested inhibited lipase activity to some extent. At 2% concn., AP completely (100%) inhibited lipolytic activity, and AT inhibited lipolytic activity by 89%. At 40 C, the effectiveness of AP and AT as lipolytic inhibitors decreased, and the low concn. of BHT, BHA, TBHQ, Tenox 4 and Tenox 8 stimulated lipolytic activity. AS

Pseudomonas fragi

1129

Harmayani (E), Sofos (JN) and Schmidt (GR). **Growth and aminopeptidase activity of *Pseudomonas fragi* in presence of phosphates.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 350-354

Sodium hexametaphosphate (0.3 and 0.5%) virtually eliminated the growth of *Ps. fragi* and repressed aminopeptidase activity during 5 days at 5 C in trypticase soybroth. The effects of phosphates were in the following order: sodium

hexametaphosphate > sodium acid pyrophosphate > sodium tripolyphosphate and tetrasodium pyrophosphate ($P > 0.05$). BV

Fungi

1130

Wheeler (KA), Hurdman (BF) and Pitt (JI). **Influence of pH on the growth of some toxigenic species of *Aspergillus*, *Penicillium* and *Fusarium*.** *International Journal of Food Microbiology* 12(2/3): 1991: 141-150

The effect of pH on the growth rates of 61 isolates belonging to 13 important toxigenic fungi are reported here: four species each of *Aspergillus* and *Fusarium*, and five of *Penicillium*, over the pH range 2 to 11 at 25, 30 and 37 C. Nearly all species studied were able to grow over the entire range examined on a lab. agar medium. However, in general *Aspergillus* species were more tolerant of alkaline pH while *Penicillium* species appeared to be more tolerant of acidic pH. AS

Aspergillus

1131

Reynolds (G) and Pestka (JJ). **Enzyme-linked immunosorbent assay of versicolorin A and related aflatoxin biosynthetic precursors.** *Journal of Food Protection* 54(2): 1991: 105-108

An immunochemical approach is described for the detection of versicolorin (VA) and other aflatoxin precursors in *Aspergillus parasiticus* cultures. VA was purified from *A. parasiticus* ATCC 36537 cultures by semipreparative HPLC and confirmed by mass spectrometry and ultraviolet (UV) absorption. To be rendered immunogenic, VA was converted to a hemiacetal and conjugated to bovine serum albumin (BSA) by reductive alkylation. Rabbit polyclonal antiserum prepared against the VA hemiacetal-BSA conjugate was employed in a competitive ELISA using VA hemiacetal-horseradish peroxidase conjugate as the marker ligand. Based on the amount of VA analogue required to inhibit binding by 50% in competitive ELISA, cross-reactivity relative to VA for VA hemiacetal, averufanin, averantin, norsolorinic acid, averufin, sterigmatocystin, and aflatoxin B₁ were 106, 85, 7, 6, 2 and < 1% respectively. The ELISA was used to monitor enhanced production of VA equivalents by *A. parasiticus* ATCC 36537 in a modified culture procedure. The VA antibody should be extremely useful in the biochemical and genetic investigation of aflatoxin biosynthesis. AS

Aspergillus flavus

1132

Criseo (G), Urzi (C), Pernice (I) and Medici (MA). **Growth and aflatoxin production by *Aspergillus flavus* Link under cycling temperatures.** *Italian Journal of Food Science* 2(1): 1990: 43-51

The effects of cycling temp. of mycelial growth and aflatoxin production by *Aspergillus flavus* Link were studied using 3 cycles characteristic of the climate in southern Italy; they were compared to the control, constant 28 C. *A. flavus* development on yeast extract sucrose medium measured as mycelial dry wt. was higher at constant 28 C within the first 6 days, whereas greater growth was observed from the 10th to 18th day at the three cycling temp. Growth on moistened maize kernels was directly related to thermal input within the first wk of incubation. After the first wk, growth behaved differently according to the utilized temp. *A. flavus* produced aflatoxins under all four temp. conditions. Summer and spring cycles increased aflatoxin production while the Autumnal cycle did not. Compared with the constant temp. of 28 C the time required for the biosynthesis of toxins by the mold was inversely related to the total amount of heat input. AS

Mushrooms

1133

DaDamio (PA) and Thompson (DB). **Mushroom (*Agaricus bisporus*), its polyphenoloxidase, and polyphenolics affect in vitro iron availability.** *Journal of Food Science* 57(2): 1992: 458-461, 511

In vitro Fe availability (IA) from egg white meals was 14 - 17% of total meal Fe. When mushroom (*Agaricus bisporus*) was added to egg white meals, IA decreased. The initially low IA from whey protein conc. meals (< 1% of meal Fe) was enhanced by mushroom. Sodium benzoate or sodium bisulphite added to egg white/mushroom meals increased IA. Addition of polyphenoloxidase (PPO) and gallic acid to egg white meals decreased IA; however, gallic acid alone increased IA. Blanching mushrooms eliminated PPO activity and increased IA of egg white/mushroom meals, but it was still less than for egg white meals. Sodium bisulphite added to blanched mushroom/egg white meals increased IA above that for egg white meals. Results are consistent with the interpretation that enzymatic browning can decrease IA. AS

1134

Vijaya Sethi, Jai Bhagwan, Neeta Behal and Sashi Lal. **Low-cost technology for preserving mushrooms (*Agaricus bisporus*).** *Indian Food Packer* 45(6): 1991: 22-26

Blanched and unblanched mushrooms (*Agaricus bisporus*) were preserved for 1 yr. using salt (2%), sugar (2%), citric acid (0.3%), potassium meta bisulphate (0.1%) and ascorbic acid (1.0%) with steeping preservation technique. Blanching helped in the retention of colour, flavour and texture up to 6 months while unblanched mushrooms spoiled within 3 months. This preservation technique is economical and simple. GS

Yeasts

1135

Delana (P), Cecchi (L), Lodi (R), Berardi (E), Farris (GA), Fatichenti (F). **Some aspects of diacetyl and acetoin production by *Debaryomyces hansenii*.** *Italian Journal of Food Science* 2(1): 1990; 35-42

Both acetoin and diacetyl were produced by *Debaryomyces hansenii* in synthetic media using lactic acid with glucose and glucose alone as sole carbon sources. The production of these metabolites was confirmed by the radiotracer (^{14}C) technique. Quantitative detn. were subjected to factorial analysis of variance. Diacetyl production was significantly influenced by strain and substrate. A higher value was found for each strain with the glucose substrate. Strain SGS11 and glucose gave the highest production, while strain F3512 and lactate gave the lowest. Acetoin production was affected by strain, substrate and time of incubation. The biochemical pathway of production seemed to be the formation of acetoin through the decarboxylation of acetolactate and the subsequent oxidation of acetoin to diacetyl. AS

1136

Gardini (F), Castellari (L) and Guerzoni (ME). **Suitability of three instrumental methods for evaluating yeast cell viability in enology.** *Italian Journal of Food Science* 2(2): 1990; 103-111

Three unconventional methodologies for the microbiological control of wine and winery environments were compared to assess their suitability for routine control in enology. The methods examined were the adenosine triphosphate (ATP) assay technique, the direct epifluorescence filter technique and the GC detn. of metabolic CO_2 . The advantages and disadvantages of these methods are discussed in relation to the plate counting procedure, which was used as a reference. AS

Hygiene

Listeria monocytogenes

1137

Pearson (LJ) and Marth (EH). ***Listeria monocytogenes* - threat to a safe food supply: A review.** *Journal of Dairy Science* 73(4): 1990; 912-928

Aspects reviewed in this article include: general characteristics (morphology, growth requirements, biochemical properties and serotyping) of *Listeria*, listeriosis (zoonosis, transmission, virulence and disease manifestation in humans), environmental resistance (psychrotrophic properties and thermal resistance), evidence for a foodborne threat (outbreaks of foodborne listeriosis, occurrence in dairy products and other foods, behaviour during food processing and effect of lactic starter culture) isolation and recovery methods (selective or differential plating media, enrichment procedure, monoclonal antibody-enzyme immunoassay deoxyribonucleic acid hybridization, immunofluorescence and flow cytometry), maintenance of safe food supply (inactivation of pathogen in food, effectiveness of sanitation methods and food plant safety precautions). 112 references. BV

BIOTECHNOLOGY

1138

Gadgoli (C), Sarang (MS) and Jolly (CI). **Single-cell protein from the peels of *Musa paradisiaca*.** *Research and Industry, India* 37(1): 1992; 18-20

The peels of banana (*Musa paradisiaca*) were used as the medium for cultivating yeast for the production of single-cell protein. The max. protein content of 40.70% w/w and 41.18% (on dry basis) was obtained with *Torula* spp. in static condition and with *Saccharomyces* spp. in shaking conditions respectively. GS

1139

Cantarelli (C). **Biotechnology in the food industry: An overview.** *Italian Journal of Food Science* 2(1): 1990; 9-24

The integrated use of enzymology, microbiology, immunology, genetics and engineering (as biotechnology may be defined), plays a basic role in food processing. Recent findings are reviewed, starting with examples of the integration of genetic improvement of primary agricultural products and their processing as food. A concise forecast of the possibilities offered by new developments in first generation, "soft" biotechnologies and advanced, genetic or "hard" ones is presented. The main topics are: i) improvement of microbial starters; ii) microorganism and enzyme immobilization; iii) availability of "new" enzymes and their application

in replacing chemical processes, even on apolar substrates; iv) production of metabolites as ingredients and improvers; v) biotechnological (enzymatic, immunological) methods for quality control, to estimate main components, to detect contaminants, as well as for quick microbiological tests of high specificity. The role of improvements in the food sector produced by novel biotechnologies is stressed. AS

1140

Herrera (JC) and Romero (AJR). **Biological evaluation of a plantain (*Musa paradisiaca*) leaf protein concentrate.** *Italian Journal of Food Science* 2(2): 1990: 89-96

The possibility of using plantain (*Musa paradisiaca* L.) leaves as an unconventional protein source was evaluated. A leaf protein concentrate (LPC), obtained by extraction with NaOH and subsequent acid precipitation (pH = 4.5) showed the following unacceptable low nutritional parameters: Protein Efficiency Ratio (PER) = -1.1, True Digestibility (TD) = 61 plus or minus 7% and net protein ratio (NPR) = 0.1 plus or minus 0.3. Leaf protein concentrate, obtained by extraction with NaOH in the presence of sodium sulphite, heated at 85 C for 5 min, acid precipitated (pH = 6), and supplemented with DL-methionine (0.6%), showed a much better nutritional value: PER = 1.9, TD = 46 plus or minus 6% and NPR = 3.0 plus or minus 0.1. Methionine supplementation and inhibition of the oxidation of polyphenols make plantain leaves an acceptable protein source for LPC preparation. AS

TISSUE CULTURE

1141

Stafford (A). **The manufacture of food ingredients using plant cell and tissue cultures.** *Trends in Food Science and Technology* 2(5): 1991: 116-122

Plant cell cultures are a potential source of novel food ingredients with desirable flavour properties. Like microbial cultures, they can be rapidly scaled up to provide biomass for extraction and analysis. More than 80 novel compounds have been isolated from 30 different plant cells cultures; these composition include 23 alkaloids, 19 terpenoids, 30 quinones and 11 phenyl prapanoids. Several essential oils like anethole, limonene, geraniol, menthol; flavour compounds like citral, citronellol; pigments like beta-xanthin, bixin, anthocyanin, carotenoids have been derived through plant tissue culture. GS

FOOD ADDITIVES

1142

Mori (H), Iwata (H), Tanaka (T), Morishita (Y), Mori (Y), Kojima (T), Okumura (A). **Carcinogenicity study of cochineal in B6C3F₁ mice.** *Food and Chemical Toxicology* 29(9): 1991: 585-588

The carcinogenicity of cochineal, a red colouring used in food and other products, was studied in a 2 yr bioassay in B6C3F₁ mice. Groups of 50 - 55 mice of each sex were given 0, 3 or 6% cochineal in the diet for 2 yr. Mice of all groups developed tumors including hepatocellular adenomas or carcinomas, pulmonary adenomas or adenocarcinomas and lymphomas or lymphatic leukaemias, and the incidences of these tumors were not significantly different in treated and control groups. The results indicate that cochineal lacks carcinogenicity in mice and are consistent with those of *in vitro* short-term assays of cochineal and of carminic acid, an active principle of cochineal. AS

1143

Maekawa (A), Matsushima (Y), Onodera (H), Shibutani (M), Yoshida (J), Kodama (Y), Kurokawa (Y), Hayashi (Y). **Long-term toxicity/carcinogenicity study of calcium lactate in F344 rats.** *Food and Chemical Toxicology* 29(9): 1991: 589-594

Calcium lactate administered on long-term basis to groups of 50 male and 50 female rats for 2 yr in drinking-water at levels of 0, 2.5 or 5% showed neither toxic nor carcinogenic activity in F344 rats. BV

CEREALS

1144

Schiweck (H). **Sweeteners and sugar-replacer in cereal based food.** *Getreide-Mehl und Brot* 44(7): 1990: 210-213 (De)

Rice

1145

Murphy (PA), Smith (B), Hauck (C) and O'Connor (K). **Stabilization of vitamin A in a synthetic rice premix.** *Journal of Food Science* 57(2): 1992: 437-439

The thermodynamics of vitamin A (VA) loss, accelerated storage studies conducted at three to four temp. and two *a_w* and the effect of different formulation ingredients on stability kinetics was

evaluated. VA was stabilized with a combination of tocopherol, ascorbic acid and saturated lipids in the formulation. Washing stability of VA was 100%. Cooking stability was > 80% retention of VA. ΔH^{++} of VA degradation ranged from 4 to 34 Kcal/mol, depending on a_w and formulation. Entropies ranged from 11 to -79 cal/mol-deg. ΔH^{++} was unchanged averaging 29 Kcal/mol. The best t_{12s} for VA were > 1 yr. Successful stabilization of VA has enabled this premix to be used in clinical and pilot field fortification studies in the Philippines. SRA

Brown rice

1146

Champagne (ET) and Hron (RJSr). **Stability of ethanol-extracted brown rice to hydrolytic and oxidative deterioration.** *Journal of Food Science* 57(2): 1992: 433-436

Brown rice kernels extracted with EtOH at 70 C for 60 min were the most stable to lipolytic hydrolysis; free fatty acids (FFA) level in these kernels increased from 1.0 - 1.4% during 6 months of storage at 36 C. At lower extraction temp. and times, kernels were less stable to lipolytic hydrolysis. The higher the temp. of extraction, the more susceptible kernels were to oxidative deterioration during storage; extraction time was not a factor. Kernels extracted with recycled EtOH were no more susceptible to oxidation than those extracted with fresh EtOH. AS

Wheat

1147

Cara (L), Borel (P), Armand (M), Lafont (H), Lesgards (G), Lairon (D). **Milling and processing of wheat and other cereals affect their capacity to inhibit pancreatic lipase in vitro.** *Journal of Food Science* 57(2): 1992: 466-469, 484

The inhibition of pancreatic lipase activity by extracts of durum wheat, soft wheat and millet was high, moderate in barley and white sorghum and very low in red sorghum. Milling whole-grain into flours decreased the lipase inhibitory activity in all species. Processing of soft wheat by bread making, popping, flaking, drum-drying and extrusion cooking, or durum wheat by making pasta markedly decreased lipase inhibitory capacity. SRA

MILLETS

Corn

1148

Fields (ML), Tantratian (S) and Baldwin (RE). **Production of bacterial and yeast biomass in ground corn cob and ground corn stalk media.** *Journal of Food Protection* 54(2): 1991: 117-120

1149

Paster (N), Blumenthal-Yonassi (J), Barkai-Golan (R) and Menasherov (M). **Production of zearalenone in vitro and in corn grains stored under modified atmospheres.** *International Journal of Food Microbiology* 12(2/3): 1991: 157-166

The production of zearalenone by an isolate of *Fusarium equiseti* was studied in chemically defined medium and in corn grains stored under modified atm. An increase in the concn. of sucrose or xylose on Czapek's medium resulted in increased toxin production, while no toxin was produced when lactose was present in the medium. Methionine (10^{-2} and 10^{-3} M) and cystine (10^{-3} M) added to Czapek's medium inhibited zearalenone production. When amino acids or nitrogen salts were added as a sole nitrogen source, only alanine, tryptophan and NH_4Cl totally inhibited zearalenone production. Zearalenone production was inhibited almost completely in high-moisture corn grains (27%) kept under atm. enriched with high CO_2 levels (60%, 40% or 20%) with either 20% or 5% O_2 . However, a lower amount of CO_2 was needed to inhibit fungal development and toxin formation when a reduced O_2 level was applied. AS

1150

Tolaba (MP), Suarez (C) and Viollaz (PE). **Diffusion coefficient estimation for shelled corn.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 303-306

Thinlayer drying curves of shelled corn were determined at 40, 50, 60 and 70 C and 'high' RH, for a moisture range from 21 to 12%, dry basis. Simulation of the experimental drying curves was performed by means of Fick's second law for diffusion out of a sphere, with constant diffusion coeff. An accurate fitting of the experimental data was obtained assuming an equilibrium value given by the desorption isotherm of grain (static equilibrium moisture content). A reasonable agreement was also found between the dynamic equilibrium moisture content (obtained from the drying data) and the static one. A criterion was proposed, based on the monolayer moisture content, where the static equilibrium moisture fits the experimental drying curves. AS

Sweet corn

1151

Zhu (S), Mount (JR) and Collins (JL). **Sugar and soluble solids changes in refrigerated sweet corn (*Zea mays* L).** *Journal of Food Science* 57(2): 1992: 454-457

Three sweet corn (*Zea mays* L) genotypes, one cv. each, were tested for sugar and soluble solids changes at 6 C for 5 days. Genotypes and cvs. were sugary (su), 'Silver Queen': sugary enhanced (se), 'Incredible' and super sweet (sh 2), 'How Sweet It Is'. Fructose, glucose, sucrose, maltose, total sugars and °Brix were measured. Sucrose predominated. Generally, °Brix, fructose, glucose and sucrose decreased and maltose increased. sh 2 had lowest °Brix and highest sucrose and total sugars, and su had highest °Brix and lowest sucrose and total sugars. su consisted of 3.8% total sugars (DWB); se, 7.2% and sh 2, 10.9%. Overall correlation coeff. between °Brix and total sugars was -0.99. AS

PULSES

Broad beans

1152

Zheng (B-A), Matsumura (Y) and Mori (T). **Molecular forces in thermal association-dissociation and gelation of legumin from broad beans.** *Journal of Food Science* 57(2): 1992: 423-426

Chickpeas

1153

Singal (SK) and Singh (Z). **Studies of plant oils as surface protectants against pulse beetle, *Callosobruchus chinensis* (L.) in chickpea, *Cicer arietinum* L. in India.** *Tropical Pest Management* 36(3): 1990: 314-316

Chickpea seeds infested with *Callosobruchus chinensis* were treated with groundnut, coconut, mustard, sesame, soybean and rapeseed oils at 1.3 and 5 ml/kg levels. Untreated seeds showed significantly more oviposition than treated seeds in all cases. Least oviposition (34.3 eggs) occurred on seeds treated with mustard oil at 5 ml/kg, less with coconut oil at 5 ml/kg (46.0 eggs) and 3 ml/kg (47.3 eggs). The min. adult emergence (0.5%) was recorded from seeds treated with mustard oil applied at 5 and 3 ml/kg followed by groundnut (7.3%), soybean (16.7%) and rapeseed (6.2%) oils when applied at 1 ml/kg. Chickpea seeds treated with oils suffered less seed damage (0.5%) than untreated

seeds and it did not adversely effect seed germination. CSA

Cowpeas

1154

Lombardi-Bocchia (G), Carbonaro (M) and Carnovale (E). **Trypsin and chymotrypsin inhibitors for a wild species and a domestic species of cowpea (*Vigna unguiculata*).** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 370-372

Locust beans

1155

Lopes Da Silva (JA), Goncalves (MP) and Rao (MA). **Rheological properties of high-methoxyl pectin and locust bean gum solutions in steady shear.** *Journal of Food Science* 57(2): 1992: 443-448

The Cross and Carreau flow models described well the shear rate-apparent viscosity data. The coil overlap parameter, $c[n]$, correlated well with the zero-shear rate specific viscosities of these mixtures. Experimental values of intrinsic viscosities of the mixtures were in good agreement with the prediction based on an additive model of the individual contributions of the gums. From the results obtained for the mixtures of both polysaccharide sol. at similar viscosity, pH and ionic strength, no significant interactions were detected. Hypotheses for this lack of polymer interaction were developed. Results with such model systems are useful in understanding the relation of compositions to the properties of complex food systems. AS

OILSEEDS AND NUTS

Coconuts

1156

Tongdee (SC), Suwanagul (A) and Neamprem (S). **Postharvest handling of tender coocnut.** *ASEAN Food Journal* 6(2): 1991: 74-75

This paper reports on the rupture force of coconuts of different maturity stages and the use of sodium metabisulphite solution to prevent browning of the trimmed nuts. BV

Groundnuts

1157

Kim (N), Km (YJ) and Nam (YJ). **Characteristics and functional properties of protein isolates from**

various peanut (*Arachis hypogaea* L.) cultivars. *Journal of Food Science* 57(2): 1992; 406-410

Groundnut milk

1158

Lee (C) and Beuchat (LR). **Chemical, physical and sensory characteristics of peanut milk as affected by processing conditions.** *Journal of Food Science* 57(2): 1992; 401-405

Soaking peanuts in 0.1% NaHCO_3 before extraction resulted in a higher coloured peanut milk (PM), and homogenization enhanced lightness. Cooking peanuts before grinding reduced total solids and protein contents of PM. Hexanal concn. was greatly reduced by cooking peanuts for 10 min. PM made from peanuts soaked in 0.5% NaHCO_3 generally had the lowest panel ratings for green/beany, sulphur, bitter, astringent and cooked peanut flavours and chalky mouthfeel; PM prepared by soaking peanuts in 0.5% NaHCO_3 , cooking for 10 min and homogenizing the extract at 4000 psi was found satisfactory. SRA

Niger seed

1159

Pawar (VD), Upadhye (VP) and Nimkar (DJ). **Foaming properties of raw and heat treated niger seed (*Guizotia abyssinica* Cass) flour.** *Indian Food Packer* 45(6): 1991; 27-32

The foaming properties of defatted and heated (dry and moist) niger seed flour was studied at varying pH (4.0, 6.0, 7.0, 8.0 and 10.0), protein concn. (0.5, 1.0, 1.5 and 2.0% wt./vol.), stirring time (1, 2, 3 and 4 min), stirring speed (5000, 7000 and 10,000 r.p.m.) and also with the addition of 2% NaCl and 2% sucrose. Dry and moist heat decreased the protein content and nitrogen solubility index by 10.5%. The foam expansion and stability were less in dry heat than in moist heat and also in defatted flour. The foam expansion and stability increased with increase in pH, protein concn., stirring time, stirring speed and addition of NaCl, but decreased with sucrose. GS

Soybeans

Soy products

Tofu

1160

Metussin (R), Alli (I) and Kermasha (S). **Micronization effects on composition and**

properties of tofu. *Journal of Food Science* 57(2): 1992; 418-422

The proximate composition was determined on soy milk and tofu prepared from unprocessed and micronized (infrared heated) soybeans. The protein content of soymilk prepared from micronized beans was higher ($P < 0.5$) than that of the unprocessed beans indicating an increase in water dispersibility of soy protein as a result of micronization. The protein content of tofu from micronized beans was lower ($P < 0.5$) than that from the unprocessed beans, suggesting that micronization also affected the coagulation properties of the proteins. Tofu prepared from micronized beans and coagulated at 90 C using a mixture of citric acid (0.01 M) and calcium sulphate (0.03 M) showed improved characteristics. In terms of biochemical properties, the results showed that heat treatment had only minor effects on electrophoretic behaviour of protein components of the soy milk and tofu. SRA

Soy proteins

1161

Deeslie (WD) and Cheryan (M). **Fractionation of soy protein hydrolysates using ultrafiltration membranes.** *Journal of Food Science* 57(2): 1992; 411-413

The effect of membrane pore size on the mol. wt. distribution and selected functional properties of a protein hydrolysate produced from soy isolate and pronase was examined. Mol. wt. distributions were similar for permeates from 5000, 10,000 and 50,000 mol. wt. cut off (MWCO) membranes; two large fractions at 2300 and 1000 daltons. The 100,000 MWCO membrane resulted in three fractions of 25,000, 13,000 and 2300 daltons. Solubility of the hydrolysate increased with decrease in MWCO, while foam stability decreased. AS

1162

Ha (EYW), Morr (CV) and Seo (A). **Isoflavone aglucones and volatile organic compounds in soybeans: Effects of soaking treatments.** *Journal of Food Science* 57(2): 1992; 414-417, 436

The effect of three different soaking treatments (6 h in 50 C water; 6 h in 50 C 0.25% NaHCO_3 sol.; or 30 min boiling 0.25% NaHCO_3 sol.) was studied on the production of the major isoflavone aglucones, diadzein and genistein and headspace volatile organic compounds including aldehydes, alcohols and furans in soybeans. Boiling in 0.25% NaHCO_3 sol. effectively inhibited production of diadzein and genistein and also inhibited formation of hexanal, 2-hexenol, 1-heptanol, 1-octen-3-ol, 3-octanol

propanol and 3-methyl butanal, and lowered total headspace volatile organic compounds. SRA

TUBERS AND VEGETABLES

Carrots

1163

Mudahar (GS), Buhr (RJ) and Jen (JJ). **Infiltrated biopolymers effect on quality of dehydrated carrots.** *Journal of Food Science* 57(2): 1992: 526-529

The penetration pattern of biopolymers in plant tissue during processing was studied. Carrot dices were infused with dye-dextran standards of different mol. wt. (T10, T40, T70 and T500). Polymers of smaller size were found within the intercellular spaces and the cell walls. Larger polymers were found only in broken cells near the surface of the tissue. Biopolymers of small size were theorized to provide strength to the cell wall of plant tissue and assist in maintaining cellular integrity during dehydration. This was further verified in that the dextrans of mol. wt. 10,000 produced best quality dehydrated carrots with high rehydration ratio, more retention of carotenoids and high water-holding capacity. AS

Cassava

1164

Ayankunbi (MA), Keshinro (OO) and Egele (P). **Effect of methods of preparation on nutrient composition of some cassava products - garri (eba), 'lafun' and 'fufu'.** *Food Chemistry* 41(3): 1991: 349-354

Nutrient composition - moisture, crude protein, energy, sugar, iron, Ca and P for raw sample and sample of the cooked foods is presented. The gross energy values were 381.5 kcal for garri, 357.7 kcal for lafun and 180 kcal for fufu compared with 174.0 kcal for raw sample. SD

1165

Hongsprabhas (P) and Buckle (KA). **Cooked and raw cassava fermentation by fungi isolated from traditional fermented foods.** *ASEAN Food Journal* 6(2): 1991: 64-68

Cooked and raw cassava flour were used as substrate for biomass production in submerged fermentation. Filamentous fungi isolated in this study from tape ragi, and pure cultures from variety of sources (e.g. tempe) was investigated for their

potential application as a protein supplement for animal feeding. Results indicated that *Aspergillus* spp. are potentially useful microorganisms for the protein enrichment of cassava considering the protein content in the mycelium (40.5% dry wt. basis), carbohydrate conversion and protein yield. Both *Rhizopus* spp. and *Aspergillus* spp. utilised cooked starch more efficiently than raw starch. 3.3 and 2.3 g/l protein was produced in both cooked and raw starch fermentation when ammonium sulphate was used as nitrogen source. SRA

Sugar beet

1166

Park (SC) and Baratti (J). **Comparison of ethanol production by *Zymomonas mobilis* from sugar beet substrates.** *Applied Microbiology and Biotechnology* 35(3): 1991: 283-291

The potential of four sugar beet substrates from the sugar industry [syrup (S), crystallizer effluent 1 (CE1), crystallizer effluent 2 (CE2) and molasses (M)] were compared for ethanol production using an osmotolerant mutant strain of the bacterium *Zymomonas mobilis*. Sucrose of the substrates was enzymatically hydrolysed to avoid levan formation during fermentation. Nutrient supplementation experiments have shown that reproducible growth and ethanol production could be obtained on the four substrates supplemented only with magnesium sulphate (CE2 and M) or additionally with ammonium sulphate (S and CE1). Thus, addition of costly yeast extract could be avoided. All 20% (w/v) substrates showed nearly complete sugar conversion ($> 94.9\%$), good growth (0.16 h^{-1}) and ethanol production ($> 40 \text{ g l}^{-1}$). However, sorbitol formation reduced the ethanol yield (73 - 79% of the theoretical value) significantly. Batch kinetic parameters and studies of instantaneous parameters showed that enhanced osmolality of substrates ($S < CE1 < CE2 < M$) inhibited biomass production more strongly than ethanol production. In conclusion, all four sugar beet substrates could be utilized for ethanol production using this mutant strain of *Z. mobilis* with appropriate supplementation. AS

Sweet potatoes

1167

Ahmed (EM), Chang (FC), Balaban (MO) and Arreola (AG). **Extrusion cooking of sweet potato roots.** *Journal of Food Quality* 14(3): 1991: 229-239

An extruded product was prepared using a mixture of sweet potato roots (SP), high protein wheat flour (WF), oil and water. The mixture was extruded in a Wenger X-5 extruder. The best physical

characteristics of the extruded product were obtained using drum dried baked sweet potato powder (DDSPP) and WF in the ratio of 3:1, oil content of 4.0% and an initial moisture content of 12.32%. This combination yielded a 4.33 fold expansion of the product. Physical measurements on the extruded product were: diam., bulk density, expansion and percent rehydration. The carotenoid content of the extruded product did not change considerably from that of DDSPP. The use of DDSPP:WF ratio of 3:1 represented 89.86% utilization of raw SP roots on fresh wt. basis. AS

1168

Koehler (PE) and Kays (SJ). **Sweet potato flavour. Quantitative and qualitative assessment of optimum sweetness.** *Journal of Food Quality* 14(3): 1991; 241-249

Known levels of individual sugars were added to a puree from non-sweet sweet potato baked roots and evaluated. Panelists distinguished 2.5% increments of added maltose between 10 - 25%, consistently ranked the sugars for preference as maltose > sucrose > fructose (for same level of sucrose equivalents - SE), 21SE as optimum for maltose and 38SE for fructose. Results indicate that starch hydrolysis and maltose formation contribute to flavour quality. SD

Vegetables

1169

Tee (E-S) and Lim (C-L). **Carotenoid composition and content of Malaysian vegetables and fruits by the AOAC and HPLC methods.** *Food Chemistry* 41(3): 1991; 309-339

1170

Joshi (HC), Joshi (KL), Joshi (N), Pant (PC), Joshi (NC), Gupta (BP), Joshi (MC). **Quality comparison of vegetables dehydrated in solar drier and electrical oven.** *Defence Science Journal* 41(1): 1991; 87-91

Solar dehydration of cabbage, cauliflower, tomato, radish, turnip, lahi, methi and palak was found better than electrical oven dehydration in terms of time, cost and quality. Blanching was found unnecessary and the dehydrated products showed a shelf-life of 12 - 18 months stored in sealed polyethylene bags at 10 - 35 C, RH 88 - 98% retaining original colour, texture and flavour. SD

1171

Lewis (JA), Fenwick (GR) and Gray (AR). **Glucosinolates in Brassica vegetables: Green-curded cauliflowers (*Brassica oleracea* L.**

Botrytis group) and purple-headed broccoli (*B. oleracea* L. Italica group). *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991; 361-363

The glucosinolate contents of (i) six lines of green-curded cauliflowers (Di Macerata), (ii) six lines of green-curded cauliflowers with pyramidal curds (Romanesco), and (iii) nine lines of purple-headed broccoli have been determined using HPLC. Total glucosinolate contents ranged between 18.4 - 42.8 mg 100 g⁻¹ fresh wt. (i), 27.0 - 41.6 mg 100 g⁻¹ (ii), and 72.0 - 212.2 mg 100 g⁻¹ (iii). Total glucosinolate contents of green-curded cauliflower are thus lower than previously determined in the normal white-curded var., whilst the levels in purple-headed broccoli are higher than those found in the green-headed calabrese types. 3-Methylsulphinylpropyl and indolyl-3-methyl glucosinolates were the major components of all three classes, with 4-methylsulphinylbutyl glucosinolate also being present in significant amounts in Romanesco and purple-headed broccoli. The levels of total and individual glucosinolates determined in this investigation are discussed in the context of other brassicas and the anticarcinogenic properties of these vegetables. AS

Artichoke

1172

Choudhary (DK) and Kaul (BL). **Globe artichoke (*Cynara scolymus* L.) oil - a potential new source of essential polyunsaturated fatty acids.** *Research and Industry, India* 37(1): 1992; 29-30

Oil from globe artichoke seed was analysed by GLC for fatty acid composition. The oil contained linoleic acid (50.33%), oleic acid (41.6%), palmitic acid (1.35%) and stearic acid (6.59%). The oil has 91.4% essential polyunsaturated and 9% saturated fatty acids, which make it a good edible oil. GS

FRUITS

1173

Soleha (I), Kok Sian Ng and Mamat (SE). **Maintaining the storage quality of tropical dried fruit mix with glycerol.** *Journal of Food Quality* 14(3): 1991; 219-228

Pineapple and papaya cubes soaked in 60% sugar solution with 0.4% sodium metabisulphite and glycerol at 0, 15 and 20%; banana cubes treated with 0.4% potassium sorbate solution with 0, 15 and 20% glycerol without sugar; and were dried at 65 - 75 C for 5 - 10 h and mixed in equal proportion. A 300 g

samples packed in polypropylene bags of 0.04 mm thickness and stored in cardboard box at room temp. for 1 yr. Fruit mixture treated with 15 or 20% glycerol showed significantly better colour, appearance, texture and flavour than control. During storage, the colour of glycerol-treated banana darkened whereas glycerol-treated papaya became lighter and more red than the control. The glycerol treated fruit-mix which retained more SO₂ during storage, contained lower mold and bacterial counts. SD

Apples

1174

Fernandes (LI) and McLellan (MR). **Hydroxymethylfurfural accumulation in applesauce packaged in multilayer polymer films and glass.** *Journal of Food Science* 57(2): 1992: 530-531

Applesauce packaged in four different multilayer polymer films and glass was evaluated for changes in hydroxymethylfurfural content during storage. Packages were held for 15 wk at 20, 30, 37 and 43 C. Hydroxymethylfurfural content was measured by HPLC analysis every 5 wks. For all package types more HMF was measured at higher storage temp. as expected, however, total amounts of HMF also varied according to package type. Comparison of HMF across package types as an index of thermal history would be of questionable value. AS

Jackfruit

1175

Ajay Singh, Sanjeev Kumar and Singh (IS). **Functional properties of jackfruit seed flour.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 373-374

The jackfruit *Artocarpus heterophyllus* Lam.) flour contained 16.3% protein (albumins and globulins); the solubility of protein was high at both acidic and alkaline pH and suggested a single isoelectric point at pH 4.0. The *in vitro* digestibility of protein was 89%. Water (14.1%) and fat (90.2%) absorption capacities, and emulsion capacity (17%) were comparable with that of soy flour and wheat flour. BV

Mombin fruits

1176

Bora (PS), Narain (N), Holschuh (HJ) and Vasconcelos (MAS). **Changes in physical and chemical composition during maturation of**

yellow mombin (*Spondias mombin*) fruits. *Food Chemistry* 41(3): 1991: 341-348

Peaches

1177

Robertson (JA), Meredith (FI) and Forbus (WR). **Changes in quality characteristics during peach (cv. 'Majestic') maturation.** *Journal of Food Quality* 14(3): 1991: 197-207

Size, wt., ground colour 'a' values and SS/TA ratio increased significantly while firmness, DLE, hue angle, titratable acidity, quinic acid and citric acid decreased significantly with maturity. Malic acid, sucrose content and total sugars increased upto 5 - 6 grades and then decreased significantly with maturity. Sensory among maturity grades for sweetness, sourness, juiciness and flavour evaluation showed no significant difference. Maturity and quality parameters except sour flavour showed highly significant correlation. SD

1178

Robertson (JA), Meredith (FI), Lyon (BG), Chapman (GW) and Sherman (WB). **Ripening and cold storage changes in the quality characteristics of nonmelting clingstone peaches (FLA 9-20C).** *Journal of Food Science* 57(2): 1992: 462-465

Minolta "a" values, SS/TA ratio, sucrose, total sugar contents, and sweet sensory scores increased significantly with increased degree of maturity of unripened peaches. Firmness, Minolta "L" values, hue angle, TA, sorbitol, green and sour flavour attributes, and peach complex and fruity/ester aromas decreased significantly with maturity. Maturity 1 and 2 peaches stored for 8 wk at 0 C and subsequently ripened showed no significant change in physical characteristics except for firmness which increased at 8 wk storage. Maturity 1 and 2 peaches could be ripened at 20 C for up to 15 days and stored at 0 C for 8 wk without notable change in quality. AS

Plums

1179

Parmar (C), Sud (G) and Nayital (RK). **Effect of triacontanol on the fruit size and quality of plum cv. Santa Rosa.** *Indian Food Packer* 45(6): 1991: 16-17

Triacontanol at concn. of 0, 1.5, 3.0 and 4.5 p.p.m. was applied just after the pit hardening stage of the fruits. The fruit size (wt. and vol.) and total soluble solids (TSS), acidity and vitamin C were determined at harvest. Fruit wt. and vol. increased to the max.

with 4.5 p.p.m. concn. TSS and total titratable acid decreased and vitamin C content slightly increased with the application of triacontanol. GS

CONFECTIONERY, STARCH AND SUGAR

Chocolates

1180

Larumbe (A), Gonzalez (HHL), Resnik (SL) and Chirife (J). **Moisture migration and mold growth in a composite chocolate product.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 307-309

The behaviour of caramel jam-filled chocolate candy during storage at room temp. was studied. Due to the transfer of moisture between components the a_w of the chocolate coating increased during storage at 25 C. This allowed growth of fungi, which contaminated the chocolate surface. Growth experiments at varied a_w with *Eurotium chevallieri* as a test microorganism confirmed this hypothesis. AS

Cocoa

1181

Abiola (SS) and Tewe (OO). **Chemical evaluation of cocoa by-products.** *Tropical Agriculture* 68(4): 1991: 335-336

The proximate constituents, gross energy and theobromine content of cocoa husk, shell, cake and dust showed nutritive value. Husk with high content of minerals, low theobromine can be more useful for animal feeds. SD

Cocoa bean

1182

Hernandez (B), Castellote (AI) and Permanyer (JJ). **Triglyceride analysis of cocoa beans from different geographical origins.** *Food Chemistry* 41(3): 1991: 269-276

BAKERY PRODUCTS

Bread

1183

Rabe (E) and Seibel (W). **Determination of flour in whole meal breads.** *Getreide-Mehl und Brot* 44(6): 1990: 170-175 (De)

1184

Jud (B) and Brumer (JM). **Production of gluten-free breads, using special galactomannans.** *Getreide-Mehl und Brot* 44(6): 1990: 178-183 (De)

1185

Becker (HG), Brodhagen (D) and Stellar (W). **Purchase patterns and food habits of the elderly concerning bread and rolls.** *Getreide-Mehl und Brot* 44(6): 1990: 187-190 (De)

1186

Spicher (G), Rabe (E) and Driller (KH). **Influence of adding of bread on sour dough fermentation.** *Getreide-Mehl und Brot* 44(7): 1990: 202-208 (De)

1187

Sidhu (JS), Seibel (W), Brummer (J-M) and Zwingelberg (H). **Comparison of different whole wheat flours for performance in bread and chapathi.** *Getreide-Mehl und Brot* 44(7): 1990: 208-210 (De)

Muffins

1188

Holt (SD), Mcwatters (KH) and Resurreccion (AVA). **Validation of predicted baking performance of muffins containing mixtures of wheat, cowpea, peanut, sorghum, and cassava flours.** *Journal of Food Science* 57(2): 1992: 470-474

Eight formulations containing wheat, cowpea, peanut, sorghum and cassava flours showed no significant differences for 22 of 31 compositional, physical and sensory measurements when compared to traditional wheat flour formulations. Two formulations, one containing 25% each of wheat, peanut, sorghum and cassava flours and the other containing 66.7% wheat and 16.6% each of cowpea and peanut flours differed most from the control. Significant correlations between some sensory attributes and physical and compositional measurements were observed. SRA

Rolls

1189

Wassermann (L). **Frosted doughs for rolls: recipes.** *Getreide-Mehl und Brot* 44(7): 1990: 218-220 (De)

1190

Brummer (J-M) and Morgenstern (G). **Frosted doughs for rolls: mixing-fermentation-freezing.** *Getreide-Mehl und Brot* 44(7): 1990: 220-221 (De)

1191

Heberer (G). **Frosted doughs for rolls: calculation.** *Getreide-Mehl und Brot* 44(7): 1990: 221-222 (De)

MILK AND DAIRY PRODUCTS

1192

Garg (SK) and Mital (BK). **Enterococci in milk and milk products.** *CRC Critical Reviews in Microbiology* 18(1): 1991: 15-45

The significance of microorganisms in milk and milk products, with reference to public health potential is reviewed. Aspects covered are: incidence, classification (taxonomy, serological grouping, phage typing and enterocin typing), characteristics and growth, heat resistance, inhibitory properties, antibiotic sensitivity, biochemical pathways (glucose metabolism, gluconate metabolism, malate metabolism, polyols and myoinositol utilization, acetoin formation), extracellular products (gelatinase, deoxyribonuclease, hemolysin, hyaluronidase, lipase), enumeration, isolation and identification, public health significance (agents of disease, pressor amines), use as index organisms and use in product manufacture. 251 references. SRA

1193

Patel (RS), Reuter (H), Prokopek (D) and Sachdeva (S). **Manufacture of low-lactose powder using ultrafiltration technology.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 338-340

MILK

1194

Augustin (M-A) and Clarke (PT). **Calcium ion activities of cooled and aged reconstituted and recombined milks.** *Journal of Dairy Research* 58(2): 1991: 219-229

Milk powders were subjected during manufacture to the following treatments: low-, medium- or high-heat, indirect or direct UHT preheat, or no preheat. The Ca^{2+} activity-pH profiles of reconstituted milks (9% total solids, TS) in the pH range 6.06 - 6.98 and reconstituted concentrated milks (19.6% TS) and recombined concentrated milks (26% TS, 18% SNF, 8% fat) in the pH range 6.27 - 6.69 were determined. Statistical analysis of the results using a (-ln Ca^{2+} activity) transformation was used to quantify the effects of pH, preheat treatment and fat incorporation on Ca^{2+} activity. pH had a dominant effect on Ca^{2+} activity and the effects

of preheat treatment and fat incorporation were small in comparison. Depending on the batch of milk used for preparation of powders, pH accounted for 98.8 - 98.9%, 96.4 - 96.7% and 93.7 - 97.3% of the total variation in Ca^{2+} activity in reconstituted milks, reconstituted conc. milks and recombined conc. milks. The corresponding contributions of preheat treatment to variation in Ca^{2+} activity were 0.26 - 0.47%, 0.34 - 1.67% and 0.24 - 0.40%. The addition of fat to reconstituted conc. milk to yield recombined conc. milk with the same SNF: water ratio resulted in 0.03 - 3.71% variation in Ca^{2+} activity. The results suggested that differences in heat stability among powders subject to different preheat treatments are not likely to be linked to Ca^{2+} activity. AS

1195

Rajagopal (SN) and Sandine (WE). **Associative growth and proteolysis of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* in skim milk.** *Journal of Dairy Science* 73(4): 1990: 894-899

Proteolytic activities of 9 strains of *Streptococcus thermophilus* and 9 strains of *Lactobacillus bulgaricus* cultures incubated in pasteurized reconstituted NDM at 42 C as single and mixed cultures were studied. *Lactobacilli* were highly proteolytic (61.0 to 144.6 μg of tyrosine/ml of milk) and *S. thermophilus* were less proteolytic (2.4 to 14.8 μg of tyrosine/ml of milk). Mixed cultures, with the exception of one combination, liberated more tyrosine (92.6 to 419.9 μg /ml) than the sum of the individual cultures. Mixed cultures also produced more acid (lower pH). Of 81 combinations of *L. bulgaricus* and *S. thermophilus* cultures, only one combination was less proteolytic (92.6 μg tyrosine/ml) than the corresponding *L. bulgaricus* strain in pure culture (125 μg tyrosine/ml). AS

1196

Gandolfi (I), Palla (G), Delprato (L), De Nisco (F), Marchelli (R), Salvadori (C). **D-amino acids in milk as related to heat treatments and bacterial activity.** *Journal of Food Science* 57(2): 1992: 377-379

The occurrence in milk of free and bound D-amino acids was investigated by chiral phase GC and related to heat treatments and bacterial activity. Significant amounts of free D-alanine (D-Ala), D-aspartic acid (D-Asp), and D-glutamic acid (D-Glu) have been found in raw cow milk but not in human milk. The amount did not increase by pasteurization, UHT treatment, and sterilization. In contrast, the content of D-Ala in raw milk samples increased during cold storage at 4 C, and it was suggested that D-Ala may be considered as an

indicator of bacterial milk contamination. The presence of D-Ala, D-Asp and D-Glu detected in milk protein hydrolysates was due to hydrolysis conditions. AS

1197

Patel (AA) and Frede (E). **Studies on thermal properties of cow and buffalo milk fats.** *Lebensmittel-Wissenschaft und -Technologie* 24(4); 1991: 323-327

Cow (summer and winter) and buffalo (spring and summer) milk fats were studied for their solidification and melting properties using differential scanning calorimetry and nuclear magnetic resonance spectroscopy. Buffalo milk fats began to crystallize at a higher temp. (about 20 C) than did cow milk fats (15 - 18 C). A large portion of the former solidified in the higher temp. range than did the latter. Also, buffalo milk fats melted over a higher temp. range (11 - 38 C) than did cow milk fats (5 - 35 C), the former showing, again, a considerably higher proportion of the high-melting component as compared to the latter. The Indian cow (summer) fat exhibited an intermediate crystallization and melting behaviour between the buffalo fat and German cow (summer) fat. Melting at increasingly higher temp., and crystallization upon progressive holding at 0 C monitored in terms of solid fat content (SFC) revealed more or less similar differences between the different milk fats investigated. However, the Indian cow milk fat showed higher SFC values than did buffalo milk fats during early melting and crystallization processes. The spring buffalo fat appeared to be a higher melting type in comparison with the summer buffalo fat, whereas the German winter (cow) fat showed a higher melting range than that for the German summer fat. Probable compositional differences attributable to the observed variations in thermal properties are discussed. AS

1198

Pagliarini (E), Fortina (MG) and Vernile (M). **Study on optimizing conditions for the thermal stabilization of milk.** *Lebensmittel-Wissenschaft und -Technologie* 24(4); 1991: 334-337

This experiment demonstrates that by carrying out a two-step treatment, milk can be obtained having a stability comparable with that of in-bottle sterilized milk, while heat damage is only slightly higher than that in UHT-milk. BV

Milk products

1199

Salih (MA), Sandine (WE) and Ayres (JW). **Inhibitory effects of microgardTM on yoghurt and cottage**

cheese spoilage organisms. *Journal of Dairy Science* 73(4); 1990: 887-893

Three different concn. of freeze-dried MicrogardTM were investigated for their inhibitory action against spoilage organisms in two commercial brands of strawberry-flavoured yoghurt. Evaluation of the MicrogardTM activity in the commercial yoghurt samples focused on acid tolerant yeasts and gram-negative bacteria. Yeasts were the principal spoilage organisms contaminating commercial yoghurts. MicrogardTM (10% concn.) inhibited viable yeasts and preserved one commercial yoghurt brand for over 82 days at 5 C. In the other yoghurt brand, yeasts were not eliminated, but their early growth was restricted by 10% MicrogardTM. The inhibitory action of MicrogardTM against yeasts was concn. dependent. The MicrogardTM-supplemented yoghurts were also protected from spoilage by gram-negative psychrotrophs which grew out following pH increases as a result of yeast growth. In the case of commercially produced cottage cheese, a significant reduction in spoilage due to inhibition of gram-negative psychrotrophs by liquid MicrogardTM was observed. In 24 days, 90% (105 out of 114 cartons) of cottage cheese that contained liquid MicrogardTM had less than 800 gram-negative bacteria/g of cottage cheese. In 30 days, 68% (78 out of 114 cartons) of the cottage cheese had undetectable levels of spoilage organisms (< 100/g) when the cottage cheese was kept at 7 C. Less than 1% of cottage cheese that contained liquid MicrogardTM showed any surface growth (mold) and 33% of the cottage cheese that did not contain liquid MicrogardTM underwent surface spoilage in 21 days. AS

Cheese

1200

Bhowmik (T) and Marth (EH). **Role of Micrococcus and Pediococcus species in cheese ripening: A review.** *Journal of Dairy Science* 73(4); 1990: 859-866

This review covers description of micrococci, occurrence of micrococci in milk and cheese, significance and use of micrococci in cheese ripening, proteolytic, lipolytic and esterolytic enzymes of micrococci, description of pediococci, occurrence of pediococci in milk and cheese, significance and use of pediococci in cheese ripening and enzymes of pediococci. 87 references. BV

1201

Bican (P) and Spahn (A). **Low molecular-mass nitrogen components in ripening cheese.** *Lebensmittel-Wissenschaft und -Technologie* 24(4); 1991: 315-322

This study examines and compares cheese extraction procedures for samples from different stages of ripening; and development of a precise, reproducible and time-saving method of analysing cheese low mol.-mass N components. BV

Cheddar cheese

1202

Farkye (NY), Fox (PF), Fitzgerald (GF) and Daly (C). **Proteolysis and flavour developments in Cheddar cheese made exclusively with single strain proteinase-positive or proteinase-negative starters.** *Journal of Dairy Science* 73(4): 1990: 874-880

Proteolysis and flavour development in Cheddar cheese made with proteinase-positive *Lactococcus lactis* ssp. *cremoris* UC 317 or its proteinase-negative variant UC 041 were monitored during ripening. Qualitatively, electrophoretograms of the cheeses were similar throughout ripening, but electrophoretograms of water-soluble N extracts from the proteinase-negative cheeses were significantly different from those of the proteinase-positive cheeses. The levels of water-soluble N, proteinase-positive and proteinase-negative cheeses of the same age were not significantly different. However, the proteinase-positive cheese had a significantly higher level of amino N throughout ripening. Proteinase-positive cheeses received slightly higher scores for flavour and body and texture than proteinase-negative cheeses of the same age. Nevertheless, the overall quality of all the cheeses was good, suggesting that starter peptidase activity may be more important than starter proteinases in flavour development in cheese during ripening. AS

1203

Lakhani (S), Gullett (EA), Ferrier (LK) and Hill (AR). **Texture analysis of Cheddar cheese made from ultrafiltered milk.** *Journal of Food Quality* 14(3): 1991: 251-271

A trained panel assessed the texture of Cheddar cheese made from ultrafiltered (UF) milk as harder, more rubbery, crumbly ($P < 0.01$), chewy and grainy than control and commercial samples but texture profile analysis by Instron showed no significant difference. A consumer panel showed significantly less preference to UF cheese for flavour, texture and overall acceptability than control and commercial samples. SD

1204

Trepanier (G), El Abboudi (M), Lee (BH) and Simard (RE). **Accelerated maturation of Cheddar cheese: Microbiology of cheeses supplemented with *Lactobacillus casei* subsp. *casei* L2A.** *Journal of Food Science* 57(2): 1992: 345-349

Growth of lactic acid bacteria (LAB) and lactobacilli was studied in Cheddar cheeses supplemented with live and heat-shocked *Lactobacillus casei* subsp. *casei* L2A and with Neutrase to accelerate maturation. Bacterial counts of treated cheeses rapidly reached maximal values within 1 wk, whereas the control cheese reached comparable values only after 2 months. Addition of 1.0% heat-shocked lactobacilli led to an excellent quality Cheddar cheese with a 50% increase in flavour development, as determined by sensory evaluation, compared to control cheese. Addition of Neutrase (1×10^{-5} AU/g cheese) permitted a gain of an additional 10% while addition of higher concn. (2 and 4×10^{-5} AU/g cheese) resulted in undesirable bitterness. AS

1205

Li-Chan (E), Kwan (L), Nakai (S) and Amantea (GF). **Silica-based and polymeric columns for reversed-phase HPLC analysis of Cheddar cheese.** *Journal of Food Science* 57(2): 1992: 350-354

Octadecyl polymeric (ODP) vs octadecyl silica (ODS) reversed phase high-performance liquid chromatography (RP-HPLC) columns were compared for analytical separation of water-soluble fractions extracted from Cheddar cheese. A polystyrene divinylbenzene copolymer-based column did not resolve cheese water-soluble components. Good resolution was achieved on a vinyl alcohol copolymer ODP column as well as two ODS columns under optimized conditions of gradient elution, using increasing concn. of aqueous acetonitrile containing ion-pair reagent. However, the ODP column had longer useful life characteristics. Use of phosphoric instead of trifluoroacetic acid as ion-pair reagent produced a more stable chromatogram baseline and may prolong column useful life. ODP-RP-HPLC could be useful to monitor ripening of Cheddar cheese samples. AS

Chihuahua cheese

1206

Diaz-Cinco (ME), Fraijo (O), Grajeda (P), Lozano-Taylor (J) and Gonzalez De Media (E). **Microbial and chemical analysis of chihuahua cheese and relationship to histamine and tyramine.** *Journal of Food Science* 57(2): 1992: 355-356, 365

Kashar cheese

1207

Topal (RS). **Effects of different packaging materials and techniques on the curing of Kashar cheese and on its surface moulds.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 341-349

The effect of vacuum packaging in the CRYOVAC^R, BK₁, BK₃, BB₃ series on the curing of Kashar cheese with special attention to mould growth inhibition and cheese characteristics. During a 5-month storage period the use of these materials was investigated at monthly-intervals in comparison with traditional Kashar under normal storage conditions and packaging in a polyamide/polyethylene laminated pouch. The application of BK₁ and BB₃ types of the vacuum-shrink system after the preripening stage was found to be the best type of packaging/maturation. The application brings about 16% reduction in Kashar cheese loss/yr. In standard PA/PE vacuum-packed groups, a vacuum loss of around 25% and damage to the packages were observed after 3 months storage. BV

Mozzarella cheese

1208

Kindstedt (PS) and Rippe (JK). **Rapid quantitative test for free oil (oiling off) in melted Mozzarella cheese.** *Journal of Dairy Science* 73(4): 1990: 867-873

A test for free oil in melted Mozzarella cheese using standard Babcock equipment was developed and evaluated. 18 g of whole milk or part skim Mozzarella were weighed into 50 or 20% Paley-Babcock bottles, respectively. Bottles were immersed in boiling water for 4.0 min to melt cheese. Distilled water (20 ml at 57.5 C) was then added and the bottles were centrifuged hot (ca. 57.5 C) for 10 min. A portion of 1:1 distilled water:methanol (21 C) was added to a final level in the upper region of the calibrated neck and then centrifuged for 2 min. Bottles were then rocked by hand for 10 second, centrifuged for 2 min, and a second time rocked by hand for 10 second and centrifuged for 2 min. Finally, bottles were tempered in 57.5 C water for 5 min and the fat column then measured with glymol. This procedure gave a clear, defined fat column. Free oil was expressed as percentage in cheese and percentage in cheese fat. A series of recovery trials in which low moisture and part skim Mozzarellas were spiked with butter oil gave recoveries ranging from 97.3 to 104.5%. 18 replicates of a low moisture, part skim Mozzarella gave coeff. of variation of 3.3 and 6.2%, respectively. Free oil was

measured in 64 Mozzarella cheese obtained from local supermarkets and two industrial cheese plants. Free oil as a percentage of total cheese fat ranged from 8.8 to 84.9%. Free oil increased with increasing cheese fat on a dry basis. AS

Milk powder

1209

Veld (PHI), Soentoro (PSS), Asch (EHMD) and Notermans (S). **Influence of reconstitution on isolation and enumeration of *Listeria monocytogenes* from milk powder used for reference samples.** *Journal of Food Protection* 54(2): 1991: 124-126

To test the performance of the *Listeria* isolation methods, reference samples consisting of gelation capsules filled with spray-dried milk powder containing *Listeria* have been developed. During the spray-drying process the *Listeria* cells are exposed to heat stress and are susceptible to osmotic stress during the reconstitution procedure. To limit the effect of osmotic shock, the milk powder has to be encapsulated in gelatin in order to guarantee slow dissolution. Furthermore, the capsules have to be preenriched in a nonselective medium. The practical consequences of these findings are discussed. AS

Paneer

1210

Shere (DM), Rathi (SD), Babje (JS) and Pawar (SG). **Studies on qualities of paneer from buffalo milk, soya milk and soy-buffalo blend.** *Indian Food Packer* 45(6): 1991: 37-41

Paneer was prepared by blending 10, 20 and 30% soy milk with buffalo milk and also using buffalo milk and soy milk alone. CaCl₂ was added at the rate of 0.5, 0.1 and 0.02% levels. Moisture, fat, ash and protein content were determined. Paneer prepared with higher concn. of CaCl₂ scored lowest for body and texture, flavour and taste; 0.02% CaCl₂ improved the product without affecting its chemical composition. Buffalo milk paneer was rated highest and those made from 10 and 20% soy milk sensorily resembled buffalo milk paneer. Soy milk paneer had the highest moisture and protein contents but lowest content of solids (30.21) and fat. GS

Wheys

1211

Brandenberg (AH), Morr (CV) and Weller (CL). **Gelation of commercial whey protein concentrates: Effect of removal of**

low-molecular-weight components. *Journal of Food Science* 57(2): 1992; 427-432

Low-mol.-wt. solutes were removed from reconstituted, commercial whey protein concentrate (WPC) and isolate (WPI) by centrifugal gel filtration. Effects on gelation properties were investigated as a function of pH, protein concn., and mineral ion addition by least concn. endpoint (LCE) and uniaxial compression testing. Partial removal of low-mol.-wt. solutes had little effect on WPC and WPI gelation. Lowest LCE values were obtained at pH 6, 0.2M ion addition, and with KCl and CaCl₂ addition. Highest gel firmness (shear stress and strain) values were at pH 6 and 7.5, and 0.1M ion addition. WPI functioned better than WPC by both test procedures. AS

1212

Fairbrother (P), George (WO) and Williams (JM). **Whey fermentation: On-line analysis of lactose and lactic acid by FTIR spectroscopy.** *Applied Microbiology and Biotechnology* 35(3): 1991; 301-305

The batch fermentation of whey permeate by *Lactobacillus helveticus* 8652, was monitored on-line by Fourier transform infrared (FTIR) spectroscopy. Substrate (lactose) and product (lactic acid) levels were measured over a period of 47 h. A method for the quantitative analysis of the two components was first established. Fifteen standard solutions containing both lactose and lactic acid were used. The method developed was tested using validation samples of known composition. Mean errors of 1.1% and 0.9% were attained in the measurement of lactose and lactic acid respectively. Sample analysis is fast (approx. 3 min), simple and almost completely automated. The results obtained with FTIR spectroscopy compared favourably with samples analyzed off-line using enzyme kits. AS

1213

Sanchez (HD), De La Torre (MA), Osella (CA), Mancuello (C), Maffia (LM), Kuck (AM), Gallina (R), Renner (E), Drathen (M). **Application of whey-protein-concentrates with the production of soda-crackers.** *Getreide-Mehl und Brot* 44(6): 1990; 183-186 (De)

Yoghurts

1214

Ramaswamy (HS) and Basak (S). **Pectin and raspberry concentrate effects on the rheology of stirred commercial yoghurt.** *Journal of Food Science* 57(2): 1992; 357-360

The rheological properties of stirred yoghurt were influenced by addition of pectin (0.0 - 0.5%) and raspberry concentrate (64°B: 0 - 10%). Pectin resulted in increased sample viscosity that was more shear-stable, while increased viscosity resulting from the addition of concentrate was less shear-stable. The rheology of flavoured yoghurt could be designated or controlled by mixing stirred yoghurt with suitable proportions of pectin and/or fruit concentrates. SRA

Milk proteins

1215

Tsoubeli (MN) and Labuza (TP). **Influence of dairy proteins on aspartame stability in the pH 6-7 range.** *Journal of Food Science* 57(2): 1992; 361-365

Aspartame stability in the presence of caseinates significantly decreased the pseudo first order loss rate at low buffer concn. and higher temp. (70 - 80 C), whereas the rate was faster in the presence of casein/whey mixture. At high buffer concn., the rate of loss was not affected by protein. At 4 and 30 C, the rate of loss was not affected by calcium caseinate. SRA

1216

Klemaszewski (JL), Das (KP) and Kinsella (JE). **Formation and coalescence stability of emulsions stabilized by different milk proteins.** *Journal of Food Science* 57(2): 1992; 366-371, 379

The vol. fraction of oil emulsified, surface area, droplet diam., and coalescence rates of emulsions stabilized by different milk proteins were studied at protein concn. of 0.25, 0.5, 1.0 and 2.0% (w/w); pH 4, 5, and 7; and ionic strengths 0.1 and 0.2. The emulsion activity index and coalescence stability generally increased with increasing protein solubility and hydrophobicity. The vol. fraction of oil emulsified decreased with increasing ionic strength. Coalescence stability correlated with droplet diam. for emulsions stabilized by α -lactalbumin, β -lactoglobulin, and sodium caseinate ($r^2 = 0.96$). With the exception of β -lactoglobulin-stabilized emulsions, coalescence stability was largely unaffected by pH. AS

1217

Hung (SC) and Zayas (JF). **Protein solubility, water retention, and fat binding of corn germ protein flour compared with milk proteins.** *Journal of Food Science* 57(2): 1992; 372-376, 384

Protein solubility (PS), water retention (WR), and fat binding (FB) of corn germ protein flour (CGPF), nonfat dry milk (NFD), whey protein concentrate

(WPC), and sodium caseinate (SC) were comparatively studied using response surface methodology. PS and WR of all samples were affected by pH except for WR of CGPF. PS and WR of all samples were not affected by incubation temp. except of WR of CGPF. Incubation temp. influenced FB of CGPF and WPC but not of NFDM and SC. Sample concn. significantly affected FB of all samples. CGPF was an effective protein source in terms of WR and FB. For FB, SC > CGPF=NFDM > WPC and for PS, WPC=NFDM=SC > CGPF. AS

MEAT AND POULTRY

1218

Rose (BE), Llabres (CM) and Bennett (B). **Evaluation of a colorimetric DNA hybridization test for detection of *Salmonellae* in meat and poultry products.** *Journal of Food Protection* 54(2): 1991: 127-130

A commercially available colorimetric DNA hybridization test was compared with the USDA/FSIS conventional culture method for detection of salmonellae in naturally contaminated meat and poultry products and inoculated ground beef samples. All samples which were *Salmonella*-positive by the culture method were also positive by the DNA probe assay. There were no false-negative or false-positive results by the colorimetric DNA hybridization test, which was slightly more sensitive than the culture method. AS

1219

Hayakawa (I), Kajihara (J), Morikawa (K), Oda (M) and Fujio (Y). **Denaturation of bovine albumin (BSA) and ovalbumin by high pressure, heat and chemicals.** *Journal of Food Science* 57(2): 1992: 288-292

1220

Faustman (C), Yin (MC) and Nadeau (DB). **Colour stability, lipid stability and nutrient composition of red and white veal.** *Journal of Food Science* 57(2): 1992: 302-304, 311

Meat

1221

McCormick (RJ), Collins (DA), Field (RA) and Moore (TD). **Identification of meat from game and domestic species.** *Journal of Food Science* 57(2): 1992: 516-517, 520

Isoelectric focusing combined with specific enzyme staining for creatine kinase was used to characterize banding patterns in meat from pronghorn, mule

deer, white-tailed deer, sheep, moose, pork, bison, elk, caribou, red deer, beef and goat. Processed and cooked pork was differentiated from all species and beef and elk were separated from pronghorn. It was not possible to differentiate beef from elk, or pronghorn from sheep. The inability to separate some game from some domestic sp. and the lability of the staining proteins after heating above 67 C limits the application of this technique. AS

1222

Loprieno (N), Boncristiani (G) and Loprieno (G). **An experimental approach to identify the genotoxic risk from cooked meat mutagens.** *Food and Chemical Toxicology* 29(6): 1991: 377-386

In order to define the toxicological risk to the human population from the chemical compounds formed during the process of cooking animal meat, which have been described as possessing mutagenic, genotoxic and carcinogenic activities, an extensive study was undertaken of cooked meat extract and two cooked meat mutagens, 2-amino-3-methylimidazo(4,5-f)quinoline (IQ) and 2-amino-3,8-dimethylimidazo(4,5-f)quinoxaline (MeIQx). The study involved toxicokinetics and mouse-tissue distribution studies of the two chemicals, *in vitro* and *in vivo* mutagenicity/genotoxicity analyses (i.e. the detection of gene mutations, chromosome aberrations and micronuclei in mouse bone marrow cells, and mouse urine and faeces mutagenicity tests), as well as *in vivo* protein and DNA binding assays. IQ and MeIQx were found to be positive for the induction of gene mutations in *Salmonella typhimurium* TA98, but not in Chinese hamster V79 cells; IQ only was found to be positive for the induction of chromosome aberrations in Chinese hamster ovary cells and cultured human lymphocytes. IQ and MeIQx were negative for the induction of micronuclei in mice treated with 40 mg chemical/kg body wt.; the lowest effective dose administered to the mice that produced mutagenic urine was 0.4 mg IQ/kg body wt. and 0.04 mg MeIQx/kg. A dose of 40 mg IQ/kg, given orally by gavage to mice, produced an excretion of 1 - 4% of the applied dose in the urine and 0.1 - 2% of the applied dose in the faeces, when evaluated chemically or mutagenically. The number of DNA adducts in the liver correlated with the dose of IQ or MeIQx administered to the mice. All the data have been used for defining a possible risk estimate to the human population as a consequence of a cooked meat diet. AS

Beef

1223

Fu (A-H), Molins (RA) and Sebrabek (JG). **Storage quality characteristics of beef rib eye steaks packaged in modified atmospheres.** *Journal of Food Science* 57(2); 1992: 283-287, 301

1224

Siragusa (GR) and Dickson (JS). **Inhibition of *Listeria monocytogenes* on beef tissue by application of organic acids immobilized in a calcium alginate gel.** *Journal of Food Science* 57(2); 1992: 293-296

1225

Dickson (JS). **Acetic acid action on beef tissue surfaces contaminated with *Salmonella typhimurium*.** *Journal of Food Science* 57(2); 1992: 297-301

1226

Oreskovich (DC), Bechtel (PJ), McKeith (FK), Novakofiski (J) and Basgall (EJ). **Marinade pH affects textural properties of beef.** *Journal of Food Science* 57(2); 1992: 305-311

1227

Arnold (RN), Scheller (KK), Arp (SC), Williams (SN) and Schaefer (DM). **Visual and spectrophotometric evaluations of beef colour stability.** *Journal of Food Science* 57(2); 1992: 518-520

Mutton

Sheep

1228

Farid (A). **Carcass physical and chemical composition of three fat-tailed breeds of sheep.** *Meat Science* 29(2); 1991: 109-120

Physical and chemical composition of carcasses of 73 intact ram lambs of three fat-tailed Iranian breeds: Karakul (K), Mehraban (M) and Baluchi (B) were studied. Lambs were 195 days old at slaughter. Wt. of wholesale cuts and bone, fat trim and trimmed meat of each cut were recorded. Moisture, protein, ether extract and ash were determined in each of the deboned cuts. The higher ($P < 0.01$) proportion of leg and shoulder in K compared with those in other two breeds was due to a smaller ($P < 0.01$) tail fat in the former breed. The breeds were not different for wt. of wholesale cuts as percentage of tail-free carcasses. Tail-free carcass of K lambs had the highest percentage of bone,

protein and moisture, and those of M had the highest fat trim and the lowest bone as compared with the other breeds. The small-size Baluchi, which is well adapted to the sub-desert conditions, was the fattest of the breeds, as assessed by its highest ranking for percentage of ether extract in the carcass. On the basis of protein content, the values of M and B tail-free carcasses were 93% and 89% as high, respectively, as that for K. Differences among the breeds for the physical and chemical constituents of wholesale cuts as a percentage of the same component in half carcass without tail were small. On the basis of percentage protein, the values of shoulder, back and flap + neck were 102, 98 and 85% as high, respectively, as that for leg. AS

Pork

1229

Toldra (F), Torrero (Y) and Flores (J). **Simple test for differentiation between fresh pork and frozen/thawed pork.** *Meat Science* 29(2); 1991: 177-181

Pigs

1230

Lonergan (SM), Sebranek (JG), Prusa (KJ) and Miller (LF). **Procine somatotropin (PST) administration to growing pigs: Effects on adipose tissue composition and processed product characteristics.** *Journal of Food Science* 57(2); 1992: 312-317

1231

Lentsch (DM), Prusa (KJ) and Miller (LF). **Composition, separation and denaturation of Longissimus muscle proteins from pigs treated with porcine somatotropin (pSt).** *Journal of Food Science* 57(2); 1992: 318-321

1232

Dransfield (E), Ledwith (MJ) and Taylor (AA). **Effect of electrical stimulation, hip suspension and ageing on quality of chilled pig meat.** *Meat Science* 29(2); 1991: 129-139

1233

Oliver (MA), Gispert (M), Tibau (J) and Diestre (A). **The measurement of light scattering and electrical conductivity for the prediction of PSE pig meat at various times of post-mortem.** *Meat Science* 29(2); 1991: 141-151

Rabbits

1234

Cambero (MI), Hoz (L), Sanz (B) and Ordonez (JA). **Lipid and fatty acid composition of rabbit meat. Part I. Apolar fraction.** *Meat Science* 29(2): 1991: 153-166

The apolar lipid contents and the fatty acid composition of meat from two rabbit breeds (New Zealand white and commercial hybrid HYLA) fed two commercial diets of different protein and crude fibre levels have been studied. The total and apolar lipid content of meat from both rabbit breeds ranged from 4.9 to 10.5% (wet wt.). The individual lipid classes of the apolar fraction are described. Triglycerides accounted for more than 80% of total apolar lipids. The fat from rabbit meat is comparatively richer in palmitic acid (about 40% being always the major fatty acid), in linoleic acid and in myristic acid and poorer in stearic acid than other meats. Although differences in the fatty acid compositions of meat were observed, only clear influences of age, sex, breed, and/or feeding on the fatty acid C-16:0, C-18:2 of total and apolar lipids were found. AS

1235

Cambero (MI), Hoz (L), Sanz (B) and Ordonez (JA). **Lipid and fatty acid composition of rabbit meat. Part 2. Phospholipids.** *Meat Science* 29(2): 1991: 167-176

The phospholipid contents (and their fatty acid composition) of the meat of two rabbit breeds (New Zealand white and the commercial hybrid HYLA) fed with two commercial diets of different protein and fibre contents, have been determined. The phospholipid contents in the meat of both rabbit breeds ranged from 9 to 19% total lipid. In this fraction seven different phospholipid classes were detected but phosphatidylcholine (PC) and phosphatidylethanolamine (PE) had av. percentages of 50 and 20 of the total phospholipids. The major fatty acids of both phosphatidylcholine and phosphatidylethanolamine were C-16:0, C-18:0, C-18:1 and C-18:2, these together representing more than 70% of the total fatty acids. In general, the PC had an higher saturated fatty acid content than PE, which had a lower percentage of C-16:0 but higher C-20:4. Although differences in the fatty acid composition of the phospholipid fractions of the rabbit meat were observed, the only clear influences of age, sex, breed, and/or feeding were found with the C-16:0, C-18:0 and C-18:2 fatty acids. AS

Products

1236

Lazarides (HN). **Application of the transformed GAB equation to delineate moisture sorption behaviour of an intermediate moisture meat product.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 310-314

The Guggenheim-Anderson-De Boer (GAB) and the HALSEY isotherm equations were evaluated for goodness of fit to moisture sorption data of basturma, a traditional intermediate moisture meat product. The GAB equation gave satisfactory goodness of fit for a_w values between 0.4 and 0.9, with mean relative deviation modules (E) values close to or less than 5%. The HALSEY equation gave much higher E-values, indicating a limited ability of this isotherm model to describe moisture sorption behaviour of the specific product. Practical implications on processing, packaging and storage of the product are discussed. AS

Ham

1237

Harmon (CJ), Means (WJ) and Kemp (JD). **Bind, sensory and chemical properties of restructured dry-cured hams.** *Journal of Food Science* 57(2): 1992: 322-324

Poultry

1238

Conner (DE). **Temperature and NaCl affect growth and survival of *Escherichia coli* 0157:H7 in poultry-based and laboratory media.** *Journal of Food Science* 57(2): 1992: 532-533

In tryptic soy broth (TSB) and a poultry extract broth (PB) with 0 to 10% (w/v) NaCl incubated at 37 °C, growth of *E. coli* 0157:H7 was inhibited at greater than or equal to 8% NaCl whereas at 10 °C, growth was inhibited at greater than or equal to 4% NaCl in TSB and at greater than or equal to 6% NaCl in PB. The bacterium did not grow at 4 °C. Increased NaCl-sensitivity observed at 10 °C was a bacteriostatic effect that was ineffective with increasing incubation temp. At 10 °C, *E. coli* 0157:H7 was more salt-tolerant in PB than in TSB, although PB growth rates were lower. Findings suggest that PB may be more suitable medium for testing *E. coli* 0157:H7 in poultry products. Cells of *E. coli* 0157:H7 that were exposed to refrigeration (4 °C) and/or NaCl for 24 days did not grow on MacConkey agar with 1% sorbitol. AS

Chickens

1239

Yang (TS) and Frohing (GW). **Selected washing processes affect thermal gelation properties and microstructure of mechanically deboned chicken meat.** *Journal of Food Science* 57(2); 1992: 325-329

1240

Lamuka (PO), Sunki (GR), Chawan (CB), Rao (DR) and Shackelford (LA). **Bacteriological quality of freshly processed broiler chickens as affected by carcass pretreatment and γ -irradiation.** *Journal of Food Science* 57(2); 1992: 330-332

γ -irradiation of freshly processed chicken carcasses at 2.5 kGy delayed microbial growth resulting in extended shelf-life and reduced the initial loads of *Yersinia* and *Campylobacter*. The counts remained lower in irradiated samples than in unirradiated samples stored for 18 days at 4 C. Salmonellae incidence was completely eliminated by irradiation. Thermophilus whey treatment of chicken carcasses reduced the incidence of salmonellae (67% to 20%) on chicken carcasses compared to controls. Combination treatment with thermophilus whey and irradiation was no more effective than treatment with irradiation alone. As evidenced by the bacterial counts the shelf-life was found to be 15 days for irradiated carcasses compared to about 6 days for the unirradiated samples. SRA

Broilers

1241

Kukde (RJ), Thakur (BS) and Deshmukh (AD). **Organolepsis of meat of broilers fed on various bio-stimulators.** *Poultry Guide* 29(2); 1992: 39-41

Broilers of 150-day old were fed with biostimulators prepared from goat testicles, broiler testicles and chick embryo. The meat quality of biostimulator fed broilers (BFB) was tested at 8 wk of age. The sensory test was repeated in rainy, winter and summer seasons. The acceptability of meat of the BFB was found to be better than the control. However, season did not influence the acceptability of BFB chicken meat. GS

Turkeys

1242

Daum-Thunberg (DL), Foegeding (EA) and Ball (HRJr). **Rheological and water-holding properties of comminuted turkey breast and thigh: Effects of initial pH.** *Journal of Food Science* 57(2); 1992: 333-337

Results indicated that thigh meat gels (pH 6.4) had higher cooking yield, held-water, shear stress and shear strain at failure than breast meat gels (pH 5.9). Functional properties of breast meat adjusted to pH 6.4 during chopping were similar to those of thigh, whereas thigh adjusted to pH 5.9 remained different from breast. Rheological properties of breast meat gels did not increase when pH was adjusted by dialysis, suggesting that pH during chopping is important to rheological properties. SRA

1243

Chambers (EIV), Bowers (JR) and Smith (EA). **Flavour of cooked, ground turkey patties with added sodium tripolyphosphate as perceived by sensory panels with differing phosphate sensitivity.** *Journal of Food Science* 57(2); 1992: 521-523

The addition of 0.4% sodium tripolyphosphates (STPP) altered the flavour profile for ground turkey. Flavour profiles indicated that turkey patties without STPP had more intense protein, seamy, brothy and metallic character and less intense turkey and soapy character than the samples with phosphate. Both panels found similar characteristics for turkey with added phosphate, although the characteristics had slightly different order of appearance. The panel with a lower threshold for STPP found a more intense soapy character that tended to linger in the phosphate-treated samples. SRA

Products

1244

Mahapatra (CM). **Poultry products technology.** *Poultry Guide* 29(2); 1992: 69-70

Eggs

1245

Van Elswyk (ME), Sams (AR) and Hargis (PS). **Composition, functionality and sensory evaluation of eggs from hens fed dietary menhaden oil.** *Journal of Food Science* 57(2); 1992: 342-344, 349

1246

Singh (RP), and Panda (B). **Effect of modified atmosphere packaging on the keeping quality of pickled quail eggs.** *Indian Food Packer* 45(6); 1991: 12-15

The efficacy of vacuum packaging and N gas flushing on the storage life of pickled quail eggs at ambient storage (18 - 38 C, 36 - 84% RH) for 9 months was studied. Cooked and peeled eggs were dipped in a

pickling solution containing 50% vinegar, 8% common salt, 0.02% tartrazine and 2% each spice mixture, minced garlic and ginger for 48 h and packaged in flexible PFP (12 μ m polyester/90 μ m Al foil/38 μ m LDPE) laminated pouches of internal dimensions 12. x 10 cm with or without vacuum or flushed with N gas. The pickled eggs showed negligible wt. loss and slight fluctuation in their equilibrated pH (4.26) value during the storage period. The study showed that vacuum or N gas packaging of pickled quail eggs in O₂ and water impermeable PFP laminate protected from lipid autoxidation and dehydration and extended the shelf-life for 8 months as against 4 months for the control. GS

1247

Raikhy (J) and Bawa (AS). **Tartaric acid pickling of chicken eggs.** *Research and Industry, India* 37(1): 1992: 49-53

Hard cooked, cooled eggs were peeled and immersed in 1, 3, 5 and 6% tartaric acid solution in jars kept at ambient (20 - 25 C) and refrigeration (7 C) temp. till pH equilibrium was attained. The changes in pH, acidity, protein and moisture content was determined. The pH of egg yolk and white gradually increased while the acidity of the pickling solution decreased during the equilibration period of 8 - 10 days. Sensory evaluation indicated that 3% tartaric acid solution was most favourable for pickling chicken egg. GS

1248

Panda (PC), Khaterpal (N) and Nita Khanna. **Eggs for making cake.** *Poultry Guide* 29(2): 1991: 53-57

SEAFOODS

1249

Miletic (I), Miric (M), Lalic (Z) and Sobajic (S). **Composition of lipids and proteins of several species of molluscs, marine and terrestrial, from the Adriatic sea and Serbia.** *Food Chemistry* 41(3): 1991: 303-308

1250

Jayasekaran (G) and Seetharama Shetty (T). **Extrusion technology for seafood industries.** *Seafood Export Journal* 24(1): 1992: 11-13, 15-18

The possibility of adopting extrusion technology for producing value added surimi based seafood products from by-catch is described. Method of surimi production, the products that could be prepared from surimi, and the future prospects for these products are indicated. SRA

Crabs

1251

Gates (KW) and Parker (AH). **Characterization of minced meat extracted from blue crab pickling plant by-products.** *Journal of Food Science* 57(2): 1992: 267-270, 292

Mechanically extracted Blue crab meat from picking-room by products to produce the minced meat yields as the percentage of uncooked crab wt. were: white meat 3.18%; mixed minced meat 13.89%; minced leg 2.62%; and minced claw 6.39%. Total recoverable minced meat was approx. 2.2% of an uncooked crab. Each meat had distinct visual, textural and flavour attributes. Microbial levels ranged from 10⁵ to 10⁷ CFU/g. Pasteurization at 83.3 C reduced plate counts to less than 3 x 10³ CFU/g (P < 0.05). Extraction within 1.5 h of picking or icing of by-products prior to mechanical extraction stabilized microbial levels. Addition of citric acid-phosphite buster to meat pasteurized at 80.6 C reduced darkening of meats. SRA

Jellyfish

1252

Kimura (H), Mizuno (H), Saito (T), Suyama (Y), Ogawa (H), Iso (N). **Structural change of salted jellyfish during cooking.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkaishi)* 57(1): 1991: 85-90

Salted jellyfish are eaten after desalting in water, boiling, and dipping in water for several days. In this work, the structural change of salted jellyfish during the process described above has been studied by observation with a scanning electron microscope and with ordinary microscopes. The samples became shortened in the direction along the surface of the skin by boiling at 80 C for 30 min, so that the thickness which was perpendicular to the surface increased. The change is due to the shrinkage of collagen in a part of the umbrella of the jellyfish by heating, which is ascertained by the stain method and differential scanning calorimetric measurement. A network structure was observed on the surface of the heated sample. The network structure of the heated sample was destroyed after dipping in water for 6 days. Also, the surface of both the unheated and heated sample was peeled by dipping in water, and the change was larger in the heated one. Not only the thermal denaturation of collagen but these structural changes may contribute to the texture of cooked jellyfish. AS

Mussels

1253

Gore (PS), Raveendran (O), Iyer (TSG), Verma (PGR) and Sankaranarayanan (VN). **Bacterial contamination of mussels at Mahe estuary, Malabar coast.** *Fishery Technology* 29(1): 1992: 57-61

The bacterial quality of beach sand, water, sediment from Mahe estuary, mussels from mussel bed and market were studied during monsoon and post-monsoon months. Results showed presence of *Escherichia coli*, faecal streptococci and total coliforms in samples. High incidence of both bacterias were recorded during monsoon, low incidence of post-monsoon, and lowest in pre-monsoon months. Pathogens like *Salmonella* and *Vibrio cholerae* non O1 were isolated from the mussel samples. The sewage and land drainage of the region contribute to the contamination of the environment. SRA

Prawns

1254

Gupta (SS) and Subrata Basu. **Studies on individually quick frozen and block frozen prawns.** *Fishery Technology* 29(1): 1992: 80-81

The quality of individually frozen-prawns was compared with block frozen prawns (-40 C) in contact plate freezer. Analysis showed that α -amino N, salt soluble protein, moisture and total bacterial count decreased while total volatile base nitrogen increased in individually and block frozen-prawns during storage. The differences in the values of these samples were not significant ($P > 0.05$). No difference was detected in the sensory quality of the prawns during 22 wk storage and it is concluded that the quality of individually quick frozen-prawns were no way better than the block frozen-prawns. SRA

1255

Ariyani (F) and Buckle (A). **Ensiling of prawn heads.** *ASEAN Food Journal* 6(2): 1991: 58-63

The effect of mineral and organic acids on prawn heads and the proportion of acids to prawn waste to produce a stable silage has been examined during 10 wks storage at 25 - 30 C. The study indicated that either organic acids (e.g. formic acid, propionic acid) or mixtures of organic acid mineral acid (e.g. formic acid, sulphuric acid) can produce a stable prawn head silage, although the solubility of prawn head protein (upto 60%) is less than that obtained with fish protein under similar conditions. A rapid

solubilisation of prawn head protein and decrease in viscosity was observed during the first wk of storage and slower changes in subsequent wks. The best prawn head silage, with respect to pigment stability, solubilization and stability during storage was produced with 1:1 (v/v) combination of propionic acid and formic acid. 8% acid is recommended to ensure preservation, especially for longer storage times. AS

Shrimps

1256

Chen (H-C), Ho (W-L), Moody (MW) and Jiang (S-T). **Modification of *Cellulomonas flavigena* NTOU 1 characteristics for the production of shrimp hydrolysates.** *Journal of Food Science* 57(2): 1992: 271-276

Squids

1257

Ke (PJ), Fierheller (M) and Lemon (DW). **Studies on processing technology for Atlantic short-fin squid (*Illex illecebrosus*).** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 328-333

Various squid processing and utilization techniques have been investigated and evaluated. The innovated and improved processing technology has been developed in our lab. and recommended to be employed successfully for Atlantic short-fin squid (*Illex illecebrosus*). With the recommended chilling and handling operations, the fresh squid can be held for more than 4 days at Grade A with proposed physical and chemical guidelines. The techniques for freezing, thawing and skinning have been also described and compared. Various drying operations for producing dried squid and seasoned half-dried squid have been developed and recommended for Canadian squid fisheries. With various quality enhancement operations, squid resources can be effectively utilized to give certain value-added products. AS

Fish

1258

Montero (P) and Borderias (J). **Emulsifying capacity of collagenous material from the muscle and skin of hake (*Merluceius merluceius* L.) and trout (*Salmo irideus* Gibb): Effect of pH and NaCl concentration.** *Food Chemistry* 41(3): 1991: 251-267

1259

Nettleton (JA) and Exler (J). **Nutrients in wild and farmed fish and shellfish.** *Journal of Food Science* 57(2): 1992: 257-260

1260

Baldwin (J), Wells (RMG), Low (M) and Ryder (JM). **Tauropine and D-lactate as metabolic stress indicators during transport and storage of live paua, (New Zealand abalone) (*Haliotis iris*)** *Journal of Food Science* 57(2): 1992: 280-282

1261

Ajuyah (AO), Hardin (RT), Cheung (K) and Sim (JS). **Yield, lipid, cholesterol and fatty acid composition of spent hens fed full-fat oil seeds and fish meal diets.** *Journal of Food Science* 57(2): 1992: 338-341

1262

Joseph (J), George (C) and Perigreen (PA). **Effect of spices on improving the stability of frozen stored fish mince.** *Fishery Technology* 29(1): 1992: 30-34

The effectiveness of clove, cinnamon and pepper at 0.05, 0.10 and 0.20% level in extending the shelf-life of minced fish during frozen storage (-20 C) for 50 wk was investigated. It was observed that clove showed a strong antioxidant effect. Frozen storage stability increased with increase in spice concn.; but concn. > 0.2% was not appreciated by taste panel. The thiobarbituric acid value was not consistent in samples incorporated with cinnamon and pepper but clove gave good stability and effectively retarded the flavour deterioration. It was concluded that clove at 0.05% level enhanced the storage stability and acceptability for about 28 wk, but for storage upto 50 wk incorporation at 0.1% level was necessary. SRA

1263

Behanan (L), Mathew (S), Sudharma (D), Mukundan (MK) and Malika (V). **Effect of fruit juices with acetic acid on the quality and storage stability of pickled fish.** *Fishery Technology* 29(1): 1992: 40-44

Fish pickles with juices from tamarind, lime and gooseberry and acetic acid was compared with acetic acid alone for quality and shelf-life. Cut pieces of fish Pulli Kalava (*Eplnephelus* spp.) was fried and mixed with tamarind, lime and gooseberry juices and vinegar in 1:1 ratio. Experimental samples contained 200 ml each of fruit juice and acetic acid while the control pickle contained 400 ml acetic acid. They were left to mature for 2 days and packed in bottles and stored for 6 months at room temp. Sensory, bacteriological and chemical analysis were done every month. Results showed that all samples

remained good throughout the storage period. Tamarind juice with acetic acid added pickles were superior to other pickles in colour, taste and texture. Gooseberry juice and acetic acid added pickle was poor and unacceptable. SRA

1264

Sankar (TV) and Solanki (KK). **Changes in nitrogen fractions in the fillets of elasmobranchs during salting.** *Fishery Technology* 29(1): 1992: 45-47

Skinless fillets of shark (*Scoliodon* spp.) and ray fish (*Trigon* spp.) were immersed in saturated brine at 27 - 30 C. The brine was changed initially after 4 h and then after every 12 h. Samples were analysed at 4 h intervals upto 72 h for moisture, salt, total N and non-protein nitrogen (NPN). The loss of moisture, NPN and soluble protein nitrogen was rapid in the first 8 h followed by slower decrease for both shark and ray fish fillets. The losses were proportional to the salt uptake. SRA

1265

Mathen (C), Unnikrishnan Nair (TS) and Ravindranathan Nair (P). **Effect of some vegetable oils on insect infestation during storage of dry cured fish.** *Fishery Technology* 29(1): 1992: 48-52

Gingelly oil, sunflower oil, safflower oil, palm oil, rice bran oil, castor seed oil, mustard oil, groundnut oil, hydnocarpus oil, neem oil, coconut oil and cashewnut shell liquid were used to find out their insect repellancy in dried fish. Commercially dry cured silver belly fish after drying with moisture content of 27.4 - 38.3% was used. Each oil was sprayed on dry gunny bag and on the fish; unsprayed fish in untreated gunny bag was kept as control. The bags were stored at ambient condition and insect infestation was determined at regular intervals. Gingelly oil, mustard oil, sunflower oil, and hydnocarpus oil showed good insect repellency and delayed the infestation of dry cured fish. SRA

1266

Abraham (TJ), Sugumar (G), Sukumar (D) and Jayachandran (P). **Bacterial profile of fresh and spoiled fish mince from *Johnius dussumieri* at refrigerated storage.** *Fishery Technology* 29(1): 1992: 53-56

The % composition of bacterial flora varied in fresh fish, fresh mince and spoiled mince. Filleting, chopping and washing increased the bacterial count by more than one log unit. Initial total plate count (TPC) and proteolytic count (PC) of fish mince were 3.60×10^6 and 1.0×10^4 /g respectively. Proteolytic count increased to 2.60×10^6 /g in 24 h. In 11 days at 4 plus or minus 1 C, the TPC and PC increased to 8.05×10^9 and 4.10×10^9 /g, an increase of > 3.0

and 5.0 log units, respectively. Trimethyl amine nitrogen increased from 1.38 mg/100 g to 5.51 mg/100 g in one day storage. Total volatile base nitrogen increased to 31.79 mg/100 g in 5 days storage. However, fish mince showed no spoilage up to 5 days at 4 plus or minus 1 C. *Acinetobacter* and *Aeromonas* were dominant in fresh fish which decreased drastically upon mincing, washing and storage. In fresh mince 71% of the bacteria were Gram positive of which micrococcus was dominant. In spoiled mince 80% were Gram negative comprising mainly of *Vibrio* and *Pseudomonas*. SRA

1267

Subrata Basu, Gupta (SS) and Kesavan Nair (AK). **Control of blow fly larvae infestation in cured fish.** *Fishery Technology* 29(1): 1992: 82-83

Attempt was made to control infestation of blow fly larvae by controlling moisture and salt concn. in cured fish. Sciaenid fish were gutted, split open, washed, dry salted and sun-dried for 2 - 3 days. Samples were collected at regular intervals and examined for the growth of larvae. Results were statistically analysed to find a correlation between moisture and salt content in cured fish necessary to eliminate blow fly larvae. The moisture content varied between 15.7 and 61.6% and the salt content varied from 4.2 to 22.4%. The points corresponding to non-infested and infested samples were found to form two separate sets with well-specified border line, which is represented by equation, salt % = $0.335 (\text{moisture \%}) - 0.768$. This could be further simplified as salt (%) greater than or equal to 0.335 (moisture %). These definitions hold good for moisture range of 34.4 to 52.4% and salt range of 11.8 to 22.4%. SRA

1268

Mannino (S), Granata (A) and Fregapane (G). **Determination of mercury in fish muscle by square wave voltammetry.** *Italian Journal of Food Science* 2(2): 1990: 97-101

A rapid and simple method based on Square Wave Voltammetry, has been developed for the detn. of mercury in fish samples. After decomposition of the organic material by wet ashing in a High Pressure Asher, the sample is diluted and then transferred to the electrochemical cell using glassy carbon as the working electrode. Under the experimental conditions adopted the detection limit (signal/noise = 3) is 1 p.p.b. and the relative standard deviation for 9 detn. at 2.0 p.p.m. level is 4.5%. Results obtained on 10 commercial samples of fish are reported. AS

1269

Rehbein (H) and Orlick (B). **Comparison of the contribution of formaldehyde and lipid oxidation products to protein denaturation and texture deterioration during frozen storage of minced ice-fish fillets.** *Champsocephalus gunnari* and *Pseudochaenichthys georgianus*. *International Journal of Refrigeration* 13(5): 1990: 336-341

Fillets of the ice-fish *Champsocephalus gunnari* and *Pseudochaenichthys georgianus* were minced and mixed with various additives to induce the formation of formaldehyde and oxidation of lipids. The mixtures were frozen and stored for several months and protein denaturation and changes in texture were measured. Samples containing high concn. of formaldehyde were very tough in texture. However it was found that even severe lipid oxidation (up to 14 mg of malonaldehyde per kg wet mass) had only a slight influence on texture. AS

Alaska pollack

1270

Konno (K). **Suppression of thermal denaturation of myosin subfragment-1 of Alaska pollack (*Theragra chalcogramma*) by sorbitol and accelerated inactivation by pyrophosphate.** *Journal of Food Science* 57(2): 1992: 261-264

Croakers

1271

Lakshminatha Reddy, Setty (TMR) and Dora (KC). **Studies on the storage behaviour of frozen fish fingers from croaker and perches.** *Fishery Technology* 29(1): 1992: 35-39

The battered and breaded fish fingers from croaker (*Sciaenid*) and pink perch (*Nemipterus japonicus*) meat were prepared and stored for 22 wk at -20 C. Total volatile base N (TVBN), peroxide value (PV), thiobarbituric acid value (TBA), free fatty acids (FFA) were determined at monthly intervals. Aerobic plate count, mesophilic spore forming aerobes, enteropathogenic *E. coli*, *Salmonella vibrio* and *Staphylococcus aureus* were determined. The sensory qualities were assessed after frying fish fingers (180 - 200 C) for 2 min. Results showed a gradual increase in TVBN in croaker and pink perch during storage. In both samples PV increased in first 2 wk and decreased gradually. There was gradual increase in TBA upto 14 wk, FFAs increased up to 6th wk. Bacterial counts in both the fish fingers decreased throughout the storage. Food poisoning organisms were not detected. The taste panel preferred pink perch than croaker. The quality of fish fingers decreased slightly in both the samples during 22 wk storage. SRA

Red hake

1272

Owusu-Ansah (YJ) and Hultin (HO). **Differential insolubilization of red hake muscle proteins during frozen storage.** *Journal of Food Science* 57(2); 1992; 265-266

Sardines

1273

Nakayama (T), Oka (T) and Ooi (A). **Several technical factors affecting the texture of reconstructed sardine meat.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkaishi)* 57(1); 1991; 91-98

Reconstructed sardine meat was prepared from a mixture of sardine mince and sodium alginate by the aid of dialysis with respect to CaCl_2 solution. A soft consistency was preferred to match with Western style dishes. The effect of NaCl or MgCl_2 included in the CaCl_2 solution and the effect of enzyme treatment of sardine mince were investigated to obtain a soft consistency. When the NaCl concn. was more than 0.1 M, the jelly strength became remarkably smaller than that at 0.00 M NaCl. As the NaCl concn. increased, breaking deformation increased at the early stage of dialysis. A suitable soft consistency was obtained by 0.1 M NaCl and 48 h dialysis. The jelly strength at 0.004 M MgCl_2 was remarkably smaller than that at 0.000 M MgCl_2 . As the MgCl_2 concn. increased, breaking deformation increased at the early stage of dialysis, but decreased at the late stage. A moderate consistency was obtained by 0.016 M MgCl_2 and 48 h dialysis but was unacceptable due to other attributes. As the enzyme concn. increased, the jelly strength increased at the early stage of dialysis, but decreased at the late stage and as the enzyme concn. increased, breaking deformation increased, and max. breaking deformation was observed when enzyme concn. was 0.5%. When the time for enzyme treatment was increased, the jelly strength and breaking deformation increased once and then decreased, and the max. jelly strength and breaking deformation were observed when the time for enzyme treatment was 30 min. A suitable soft consistency was obtained by enzyme treatment for 30 min at 0.5% enzyme and 48 h dialysis. AS

1274

Tanaka (M), Xueyi (Z), Nagashima (Y) and Taguchi (T). **Effect of high pressure on the lipid oxidation in sardine meat.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkaishi)* 57(5); 1991; 957-963

The model systems consisting of sardine lipids and defatted meat were prepared and pressurized at 1,800 atm. After the pressure was released, the model systems were stored at 5 C. The effect of high pressure treatment on the oxidation of sardine lipids during storage was evaluated by using such oxidation indices as peroxide value, TBA number, oxygen absorption, UV absorption, browning and fluorescence. It was revealed that the oxidation of sardine lipids was accelerated by the pressure treatment and its extent was relative to intensity and duration of the treatment. In the model system prepared with sardine meat washed with water, the rate of lipid oxidation decreased and was fairly related to the amount of heme iron. When the water content of model system was altered, the oxidation rates of sardine lipids were $> 7\% > 35\% > 24\% > 17\%$. At 17 and 24% water contents, no appreciable oxidation proceeded during the storage of 4 days. On the other hand, at higher water contents the oxidation rate of sardine lipids in the pressurized model system was lower than that in the unpressurized system. AS

Tilapia

1275

Jiang (S-T), Wang (Y-T) and Chen (C-S). **Lysosomal enzyme effects on the postmortem changes in tilapia (*Tilapia nilotica* X *T. aurea*) muscle myofibrils.** *Journal of Food Science* 57(2); 1992; 277-279, 282

To investigate the effects of lysosomal proteases on myofibril fragmentation, tilapia (*Tilapia nilotica* X *T. aurea*) muscle myofibrils were incubated with isolated lysosomal fraction containing 12 units of cathepsin D/ml (G-II) and pure cathepsin D (12 units/mL G-III) at pH 5.5, 6.0 and 6.5 for 3 days at 4 C. Among samples incubated at pH 5.5, the degree of myofibril fragmentation (DMF) of G-III was highest, while, at pH 6.0 and 6.5, that of G-I suggested that cathepsin D still had proteolytic activity on myofibrils. Difference in the decrease of protein content between G-III and G-I, and between G-II and G-I indicated that proteolysis caused by cathepsin D was highest at pH 5.5, while that caused by lysosomal enzymes was highest at pH 6.5. This suggested the participation of lysosomal enzymes in the fragmentation of myofibrils. AS

Products

1276

Iso (N), Mixuno (H), Ogawa (H), Mochizuki (Y) and Masuda (N). **Differential scanning calorimetry on fish meat paste.** *Bulletin of the Japanese Society of Scientific Fisheries (Nihon Suisan Gakkaishi)* 57(2); 1991; 337-340

The thermal measurements using a differential scanning calorimeter was done with 10 kinds of fish meat, cuttlefish meat paste and chicken meat paste. The total enthalpy change, ΔH , accompanied with the thermal gelation of meat pastes were estimated. Consequently, it was found that the easy-setting meat and the easy-disintegrating meat required a small quantity of heat in order to change the structure. The setting index (S) and the disintegration index (D) depends on the ΔH -values as $\Delta H = -0.0074S + 1.047$; $\Delta H = -0.0038D + 0.783$. The easy setting property or the easy-disintegrating property corresponds to the fact that these meat pastes are easily changed by a small quantity of heat. On the other hand, the correlation could not be found between ΔH and the gel-strength. AS

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1277

Maughan (RJ). **Development and efficacy of carbohydrate-electrolyte sports drinks.** *Trends in Food Science and Technology* 2(7); 1991; 162-165

This feature examines some of the evidence that provide the physiological rationale for the formulation of carbohydrate-electrolyte products currently sold as sport drinks, and reviews studies that have investigated the effectiveness of such products in improving exercise performance. Aspects covered are: fatigue in prolonged exercise, effects of ingesting carbohydrate-electrolyte solutions during exercise, availability of ingested fluids, and composition of sports drinks. 19 references. BV

1278

Chapman (JW). **The development and use of novel yeast strains for food and drink manufacture.** *Trends in Food Science and Technology* 2(7); 1991; 176-180

This review covers classical yeast genetics, 'Neo-classical' yeast genetics development of recombinant DNA techniques, homologous gene expression and heterologous gene expression. 34 references. BV

Alcoholic beverages

Beer

1279

van Waesberghe and Ir (JWM). **Practical investigations on the possible impact of mash separation time on beer flavour and its flavour stability influence of the husk fraction.** *Technical Quarterly, Master Brewers Association of America* 28(1); 1991; 33-37

As part of a long-term research project to improve flavour stability of pale lager beers, this paper discusses the effect of husk material on beer flavour and flavour stability in relation to malt adjunct ratios, maceration time and husk fractionation. It appears that shortest contact time during mash separation and sparging helps in lowering the TBA values of cold wort and consequently in beer under comparable circumstances of fermentation. As far as verification trials could be done, that is positive in view of flavour stability. AS

Wines

1280

Pardo (I) and Zuniga (M). **Lactic acid bacteria in Spanish red rose and white musts and wines under cellar conditions.** *Journal of Food Science* 57(2); 1992; 392-395, 405

1281

Belleville (M-P), Brillouet (J-M), Tarodo De La Fuente (B) and Moutounet (M). **Fouling colloids during microporous alumina membrane filtration of wine.** *Journal of Food Science* 57(2); 1992; 396-400

Three different wines, from the same cv., were microfiltered using a device operating under static conditions and equipped with a section of monochannelled tubular alumina membrane, pore size 0.2 μm . Filtration flux curves resembled a permeation profiles observed in dynamic cross-flow conditions using a similar membrane. Minute amounts of colloidal material deposited on the surface and inside the membrane were isolated for the first time and characterized as mixtures of high mol. wt. moderately acidic grape proteoglycans (surface deposit) and low mol. wt. acidic moieties (inner deposit). These fouling colloids were likely deposited by trace amounts not detectable in crude starting wines. AS

1282

Sacchi (R), Malone (V), Giudicianni (I), Nota (G), Paolillo (L), Addeo (F). **The determination of methanol in wines by proton NMR spectroscopy.** *Italian Journal of Food Science* 2(2); 1990; 113-122

A quantitative evaluation of methanol in wines was carried out using proton nuclear magnetic resonance (^1H -NMR) spectroscopy, with high field magnets. The methanol peak intensity was compared to that of the ^{13}C -satellite of the ethanol methylene quartet allowing a rapid and direct estimation of the methanol content in wine. These results were compared with those obtained from colorimetric and GC analysis. Nuclear magnetic resonance and GC results were in excellent agreement. The ^1H -NMR method, however, has the advantage of being more rapid and nondestructive. AS

Musts

1283

Clementi (F). **Fluidbed dried immobilized cells of *Lactobacillus casei* used for L-malic acid degradation in must.** *Italian Journal of Food Science* 2(1): 1990: 25-34

The effects of fluidbed-drying and freeze-drying of polyacrylamide entrapped malolactic bacteria to be used for malic acid degradation in wine-making were compared. Fluidbed-drying was most effective because the activity of the dried beads was similar to the untreated ones. Regardless of drying temp. (from 30 to 45 C, for different durations), the rehydrated entrapped cells completely degraded L-malic acid in must (4.8 g/l), during incubation at 10 C for 20 h; they were rather stable during 15 days of repeated batch operations. The drying kinetics were determined at 35 C for 120 min, to an a_w value of 0.66. The diffusion of L-malic acid into gel remained unchanged after drying and rehydrating of the beads. AS

Non-alcoholic beverages

Coffee

1284

Clarke (RJ). **The volatile compounds of roasted coffee.** *Italian Journal of Food Science* 2(2): 1990: 79-88

About 700 different volatile compounds have now been identified in roasted coffee. Many of these compounds contribute directly to the flavour/aroma of the prepared coffee beverages, and to the aroma arising from the dry product. A number of these have been quantified in roasted coffee with some additional data relevant to actual level of roast. These compounds fall into a number of structural categories, of which various heterocyclic groups are important. It is particularly emphasized that information is lacking on a number of relevant

physical properties for many of these compounds. This information would be desirable in assessing behaviour during instant coffee processing. AS

1285

Massini (R), Nicoli (MC), Cassara (A) and Lerici (CR). **Study on physical and physico-chemical changes of coffee beans during roasting.** *Italian Journal of Food Science* 2(2): 1990: 123-130

The structural changes in green coffee beans which occur during roasting were studied using scanning electron microscopic analysis. The structure of the green coffee bean appeared homogenous, while the production of water vapour, CO_2 and other volatile compounds caused the formation of cavities and surface fractures during roasting. For dark roasting processes, as with Italian roasting, the progressive carbonization of the bean causes a lowering of the retention capacity of the volatile compounds. The release of CO_2 and the change of the pH were shown to be closely related to the observed structural changes of the bean. AS

Fruit juice

1286

de Oca (CM), Gerschenson (LN) and Alzamora (SM). **Effect of the addition of fruit juices on water activity of sucrose-containing model systems during storage.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 375-377

The addition of fruit juices (pineapple, apple, pear, plum and peach juices) to stored sucrose-containing model systems accelerated the lowering of a_w due to the catalytic effect on the rate of sucrose hydrolysis. BV

1287

Ozilgen (M), Durukan (A) and Ulgen (N). **Enthalpy-entropy and frequency factor-activation energy compensation relations for microbial death in fruit juices.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 378-381

Thermal death kinetics of *Leuconostoc mesenteroides* and *Bacillus coagulans* were studied experimentally in pH adjusted orange juice and glucose or sucrose added apple juice, respectively. The frequency factor and the activation energy of these processes were calculated by using the Arrhenius expression. The activation entropy and the activation enthalpy were calculated with the analogy between the unimolecular chemical reaction and the microbial death kinetics by using Eyring's theory. No trends were observed in variation of the kinetic parameters

with the pH values or the sugar concn., but these functions agreed with the kinetic compensation relations. Analysis of the data indicated that there was no actual isokinetic temp. for the family of related experiments, indicating that the thermal death kinetics of *L. mesenteroides* and *B. coagulans* have different mechanisms under varying conditions. AS

Apple juice

1288

Lozano (JE). **Kinetics of non-enzymatic browning in model systems simulating clarified apple juice.** *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 355-360

Model food systems containing sugars, organic acids and amino acids asparagine, aspartic and glutamic acids, considered to be the major clarified apple juice components, were used to study non-enzymatic browning (NEB). The model solutions were prepared to 50, 60 and 70°Brix, and stored at temp. ranging from 15 to 37 C. Colour, pH, acidity and 5-hydroxymethylfurfural (5-HMF) formation were determined periodically over 180 days. Results indicated an apparent zero-order reaction rate with an induction period. Calculated activation energies for NEB and 5-HMF formation were approx. 35 Kcal/mole. Major components affected the NEB rate in the following order: amino acids > reducing/total sugars > fructose/glucose > malic acid. AS

Banana juice

1289

Koffi (EK), Sims (CA) and Bates (RP). **Viscosity reduction and prevention of browning in the preparation of clarified banana juice.** *Journal of Food Quality* 14(3): 1991: 209-218

Pectinase, cellulase and hemicellulase combination was more effective in reducing viscosity and improving filterability of green and ripe banana purees than pectinase and galactomannase or cellulase combination after 3, 6 and 9 h incubation. α -amylase was not effective but potassium metabisulphite (100 mg/l) and produced a stable light colour juice than two heating methods (heating whole, unpeeled bananas at 100 C for 11 min; heating puree at 80 C for 1 - 2 min) and ascorbic acid (470 mg/l). Clarified juices treated with ascorbic acid and control darkened due to polyphenoloxidase activity. Flavour intensity of juices by sensory analysis was not significantly different. SD

Blackberry juice

1290

Rommel (A), Wrolstad (RE) and Heatherbell (DA). **Blackberry juice and wine: Processing and storage effects on anthocyanin composition, colour and appearance.** *Journal of Food Science* 57(2): 1992: 385-391, 410

Blackberry wine was made from thawed fruit (Evergreen var.) by fermentation of pulp, depectinized juice, and high-temp. short time (HTST)-treated and depectinized juice. The effects of fining and storage on pigment composition, colour and appearance were investigated. Seven anthocyanin pigments (cyanidin-3-glucoside, cyanidin-3-rutinoside, a xylose-cyanidin derivative, two acylated cyanidin derivatives, cyanidin and a polymeric derivative) were detected in the juices and wines by HPLC. Cyanidin-3-glucoside was highly unstable during fermentation. Haze development and sediment formation occurred, and 85 to 100% of total anthocyanins degraded. Blackberry juice that had been HTST-pasteurized, depectinized and fined produced wine with the most stable colour and best appearance after storage. AS

Grapefruit juice

1291

Fellers (PJ). **The relationship between the ratio of degree brix to percent acid and sensory flavour in grapefruit juice.** *Food Technology* 45(7): 1991: 68, 70, 72-75

This article reviews the effect that ratio has on flavour quality or consumer acceptance. The results of several taste panel studies evaluating processed grapefruit juice products is discussed and the correlation between ratio and flavour examined. 19 references. CSA

Orange juice

1292

Couture (R) and Rouseff (R). **Debitting and deacidifying sour orange (*Citrus aurantium*) juice using neutral and anion exchange resins.** *Journal of Food Science* 57(2): 1992: 380-384

The initial compositions of Seville, Bigaradier and Sour cv. used for deacidification using IRA-93 resins, and bitter sweet treated with IRA-93 and XAD-16 resin improved the palatability of sour orange juice. Average acidity was reduced from 57 - 87% using IRA-93 before depletion. Naringin concn. were reduced 50 - 66% in high acid juice and 89% in low acid juice using IRA-93. Under similar

conditions 24 - 30% of limonin was eliminated using IRA-93 and essentially 100% removed using XAD-16. SRA

Papaya juice

1293

Gray (J) and Mower (HF). **The role of simple carbohydrates in the suppression of hydroxyl free radicals in γ -irradiated papaya juice.** *Food Chemistry* 41(3): 1991: 293-301

Hydroxyl free radical ($\text{HO}^\cdot$), reactions with trapping agents (e.g. 2-hydroxytribose, 2-hydroxybenzoic acid, dimethylpyrrolone N-oxide) are blocked when diluted papaya juice is added to irradiated mixtures prior to exposure to ^{60}Co γ -rays. The study of these agents showed that glucose, fructose and sucrose present in juice in total concn. of 0.5 - 0.7 molar, block $\text{HO}^\cdot$ reactions producing malonaldehyde and other sugar derivatives. Heat treatment of fruit inactivates sequestered invertase enzyme in the juice and juice contains lower quantities of simple sugars to be a poorer quenching agent than unheated juice. Synthetic mixtures of simple sugars to compensate the level mimic the inhibition of $\text{HO}^\cdot$ and the production of malonaldehyde. SD

Pineapple juice

1294

Ramteke (RS) and Eipeson (WE). **Studies on concentration of pineapple juice - Evaluation of suitability of different types of evaporators.** *Indian Food Packer* 45(6): 1991: 7-11

A comparative assessment of forced circulation, falling film and plate evaporators, for the concn. of pineapple juice, was made. The concentrates were evaluated for colour, aroma retention after converting into ready-to-serve beverages, as (i) concentrates (ii) cut back concentrates and (iii) aroma added back concentrates. The aroma loss and browning intensity were max. in forced circulation evaporator, followed by plate and falling film evaporators. Aroma did not differ significantly among the 3 concentrates prepared in the three evaporators. SRA

FATS AND OILS

Oils

1295

Yen (G-C). **Thermal stability of sesame/soybean oil blends.** *Food Chemistry* 41(3): 1991: 355-360

Dielectric constant, viscosity, refractive index and absorbance at 232 nm determined on soybean oil, roasted/unroasted sesame oils and sesame/soybean oil blend showed that both roasted/unroasted sesame oils had greater thermal stability than soybean oil whose thermal stability increased after 48 h heating and blending with 20% unroasted sesame oil. SD

Canola oils

1296

Temelli (F). **Extraction of triglycerides and phospholipids from canola with supercritical carbon dioxide and ethanol.** *Journal of Food Science* 57(2): 1992: 440-442, 457

Phospholipids used as emulsifiers were sparingly soluble in supercritical CO_2 (SC-CO_2), but could be recovered with the addition of ethanol as an entrainer. Triglycerides and lipids containing phospholipids were extracted with SC-CO_2 in two subsequent steps from both canola flakes and press cake containing 0 and 5% ethanol, respectively. 70 C, 62.0 MPa and addition of ethanol at an initial level of 5% gave max. yield of lipids. TLC showed the presence of phospholipids in SC-CO_2 -ethanol extracts. SC-CO_2 extracts of flakes did not contain long chain fatty acids ($\text{C}_{20:0}$, $\text{C}_{22:0}$, $\text{C}_{22:1}$), but they were extracted when ethanol was added to flakes and when press cake was the raw material. AS

Palm oils

1297

Chong (CN), Wang (CW), Hoh (YM) and Ori (CK). **1,3-Regiospecific lipolytic modification of palm oil fractions.** *ASEAN Food Journal* 6(2): 1991: 69-73

This paper presents the findings of the enzymatic interesterification (acidolysis) of three palm oil fractions (palm oil, palm stearin and palm olein) with stearic acid by the 1,3-specific Novo immobilized lipase lipozyme (IMZO) with the view of producing a cocoa butter equivalent. Investigation showed that various biomodified palm oil fractions had triglyceride fatty acyl and total carbon number profiles comparable to that of cocoa butter. The analysis of triglyceride compositions by HPLC indicated that overall, their palmitic-oleic-palmitic (POP), palmitic-oleic-stearic (POS) and stearic-oleic-stearic (SOS) components were low at 12.2, 20.1 and 9.9% as against 18.4, 44.4 and 30.8% for cocoa butter, respectively. A very substantial incorporation of stearic acid was effected by the 1,3-specific lipase-catalysed interesterification reaction resulting in the formation of 40 - 50% of

these desirable triglycerides, whose relative compositions were comparable to that of cocoa butter. These biomodified palm oil fractions could serve as sources of the unique cocoa butter glycerides. SRA

SPICES AND CONDIMENTS

Capsicum

1298

Govindarajan (VS) and Sathyanarayana (MN). **Capsicum-production, technology, chemistry and quality. Part V. Impact on physiology, pharmacology, nutrition and metabolism; structure, pungency, pain and desensitization sequences.** *CRC Critical Reviews In Food Science and Nutrition* 29(6): 1991: 435-474

In this the concluding part of the series of reviews, the significant preference of the spice for initially evoking an aversive response, its potent physiological and pharmacological effects, and the aspects of structure activity, relationships of the pungent stimuli of the capsaicinoids are reviewed. The beneficial effects particularly associated with long usage by some ethnic groups and its safe consumption levels, with a critical review of the studies on the gastrointestinal tract, cardiovascular system, the sensory system, thermoregulation, nutritional impacts and an overview of the five series is also detailed. 173 references. SRA

Ginger

1299

Mantri (AR) and Agrawal (YC). **Effect of process variations on dried ginger quality.** *Indian Food Packer* 45(6): 1991: 33-36

Peeled and unpeeled ginger were sliced, pretreated with 2% lime solution and the sensory quality was determined after drying at 65 C. Sensory quality of dried unpeeled ginger was not good. Pretreatment of ginger is not beneficial but slicing before drying is recommended. GS

SENSORY EVALUATION

1300

Race (SW). **Improved product quality through viscosity measurement.** *Food Technology* 45(7): 1991: 86-88

This article answers the questions of how, in general, viscosity is measured; what kind of information it provides; and how the information obtained may be useful. It also takes a look at several practical applications of viscosity measurements of products like orange juice, mayonnaise, ketchup and salad dressing. CSA

1301

Billmeyer (BA) and Wyman (G). **Computerized sensory evaluation system.** *Food Technology* 45(7): 1991: 100-101

The components and working of the pen-based computer technology with graphic design software which eliminates paper ballots and manual data entry while automating sensory data collection and analysis has been discussed. Portability, ease of use and training, flexibility, cost savings, easy and inexpensive maintenance and operational conformity are the various advantages of sensory information system. CSA

1302

Miller (L). **Computerized quality control system.** *Food Technology* 45(7): 1991: 102

This article discusses the quality control system menu options that are available for organizing and compiling quality control information and practical applications of the easy-to-use program. CSA

1303

Lee (WEIII), Barrick (DM) and Welling (ES). **Time-intensity study of prolonged sweet stimuli.** *Journal of Food Science* 57(2): 1992: 524-525, 529

Prolonged intensity and hedonic (like-dislike) temporal responses and any associated adaptive behaviour toward various sweet solutions (sucrose in water) were investigated with specific focus on factors that influenced the transition from 'like' to 'dislike'. Subjects evaluated the samples using computerized time-intensity (T-I methods to produce sweetness intensity-time and like/dislike-time response curves. The higher concn. solutions resulted in adaptive behaviour. Also, like-to-dislike transition times correlated with sucrose concn., as did other defined parameters which characterized aspects of the responses, several of which displayed significant cross correlations. AS

1304

Reineccius (G). **Off-flavours in foods.** *CRC Critical Reviews In Food Science and Nutrition* 29(6): 1991: 381-402

General description of sensory properties, mechanism of occurrence, and recent research developments for the commonly occurring off-flavours in foods is reviewed. Covers chlorophenols and chloroanisoles, airborne sources of contamination, water-borne sources of contamination, pesticides, disinfectants and detergents, contamination by packaging materials and microbial contamination. 98 references. SRA

1305

Berdague (JL) and Grappin (R). Sensory characterization of foodstuffs by factorial discriminant analysis: Contribution of translation and scaling of data. *Lebensmittel-Wissenschaft und -Technologie* 24(4): 1991: 298-302 (Fr)

The aim of this paper is to present the effect of the translation and the scaling of sensory data on the results of a discriminant analysis. However, these classical transformation, often omitted in the analysis of sensory data, can be highly useful for the comparison between different foodstuffs. An example was taken which showed that the translation of data improves the discrimination of judges using the whole or only a part of the notation scale. The scaling of translated data permits the identification of judges showing either a low perception capacity of differences between products or atypical behaviour. These two transformations also result in a significant increase in the discrimination efficiency of the analysis. This increase is estimated by the distance of Manalanobis. AS

FOOD STORAGE

1306

Reichmuth (Chr). Protection of cereal based food against stored product insect pests using controlled atmospheres. *Getreide-Mehl und Brot* 44(6): 1990: 166-170 (De)

BIOCHEMISTRY AND NUTRITION

1307

Hernandez (MJM) and Alvarex-Coque (MCG). Available lysine in protein, assay using p-phthalaldehyde/N-acetyl-L-cysteine spectrophotometric method. *Journal of Food Science* 57(2): 1992: 503-505

An assay was based on reaction of free ε-amino groups in proteins with the 0-phthalaldehyde/N-acetyl-L-cysteine reagent to

form isoindoles, which absorb at 335 nm. The procedure was suitable for proteins or mixtures of proteins with available lysine contents of more than 5 mol. lysine/mol. protein and required absence of free amino acids and peptides. This method was simpler and more convenient than other methods, since it did not require hydrolysis, amino acid analysis, long heating periods or solvent extraction. AS

1308

Bendich (A). Non-provitamin A activity of carotenoids: Immunoenhancement. *Trends in Food Science and Technology* 2(5): 1991: 127-130

Carotenoids with or without provitamin A activity have been shown to stimulate the immune responses needed to fight infections and kill tumour cells. Determination of the biological significance of carotenoids must consider factors other than provitamin A activity. Recommended dietary intakes of β-carotene and other carotenoids with provitamin A activity should reflect more than simply their potential conversion to vitamin A. The detn. of dietary requirements should consider the new research that examines the many synthetic effects associated with β-carotene supplementation. There is epidemiological evidence that individuals with high carotenoid intakes have a lower risk of developing certain cancers or cataracts. GS

1309

Hitze (W), Brummel (M) and Lersch-Krotoszinski (H). Investigation of different enzymes (amylase and thermolabile amylase) in analysing dietary fibre. *Getreide-Mehl und Brot* 44(7): 1990: 199-202 (De)

Nutrition

1310

Levy (AS), Fein (SB) and Schucker (RE). Nutrition labelling formats. Performance and preference. *Food Technology* 45(7): 1991: 116-121

This article describes a consumer study conducted as one component of Food and Drug Administration's information-gathering activities on nutrition labelling formats. The study was a controlled experimental evaluation of five formats namely the control format, control/DRV format, the adjective format, the numeric format and the bar graph format. The experimental design used enables researchers to compare format performance characteristics and expressed preferences for the formats in a realistic label-use situation. The results obtained were objective performance, effects of demographics and health behaviour, accuracy

and false positives by specific nutrients, perceived performance measures and preferences. CSA

1311

Chiesara (E), Marabini (L) and Clementi (F). **Nutritional nephrocalcinosis in rats fed with bovine plasma protein.** *Italian Journal of Food Science* 2(1): 1990: 53-60

Nephrocalcinosis, a lesion which affects the kidney and consists of a deposit of calcium in the tubular lumina, epithelial cells and extracellular space, was induced in rats fed for four months with a diet in which 80% of the protein had been substituted with bovine plasma protein. This protein probably affect one or more steps of the control process of calcium metabolism. This action is supported by other concomitant events, as shown by the fact that nephrocalcinosis occurs principally in female animals and in particular species of animals. AS

TOXICOLOGY

1312

Mukherjee (A) and Giri (AK). **Sister chromatid exchange induced by 'pan masala' (a betel quid ingredient in male mice in vivo.** *Food and Chemical Toxicology* 29(6): 1991: 401-403

An aqueous suspension of pan masala injected to mice at doses of 5, 12.5, 25, 100 or 200 mg/kg body wt. showed a significant dose-related increase in sister chromatid exchange. The min. effective dose was 25 mg/kg. The results confirm that pan masala can induce DNA damage and is cytotoxic to bone marrow cells. BV

1313

Beaver (RW). **Decontamination of mycotoxin - containing foods and feedstuffs.** *Trends in Food Science and Technology* 2(7): 1991: 170-173

This article reviews the methods for decontamination of mycotoxin-containing foods and feedstuffs. Method covered are (a) physical methods (belt screening, electronic colour sorting, hand-picking and milling); (b) chemical decontamination using ammonia, calcium hydroxide, ozone, sodium hydroxide and sodium bisulphite; (c) radiation treatment through visible light, ultraviolet light, γ -radiation and electromagnetic radiation; and (d) feed additives (ethoxyquin, BHT, manganese salts and hydrated sodium calcium aluminosilicate) to bind mycotoxins. 36 references. GS

FOOD LAWS AND REGULATIONS

Nil

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GENERAL

1314

Pruthi (JS). **Need for updating agro-food production and processing technologies in India.** *Beverage and Food World* 18(4): 1991: 39-44

FOOD PROCESSING

1315

Roos (Y) and Karel (M). **Applying state diagrams to food processing and development.** *Food Technology* 45(12): 1991: 66, 68-71, 107

This article summarizes the results obtained from the state diagrams based on experimental and calculated data to characterize the relevant water content, temp. and time-dependent phenomena of amorphous food components. The applications of state diagrams in dehydration, crystallization of amorphous sugars and freezing and its use in the formulation of food products are also discussed. CSA

FOOD PACKAGING

Nil

FOOD ENGINEERING AND EQUIPMENT

1316

Spencer (G) and Thomas (R). **Fouling, cleaning and rejuvenation of formed-in-place membranes.** *Food Technology* 45(12): 1991: 98-99

Formed-in-place membranes which can be formed in place of permanent porous substrates, their performance restoration methods and its advantages are discussed in this article. CSA

1317

Phelps (BW). **Spiral-wound crossflow membrane element design for processing high-fouling solutions.** *Food Technology* 45(12): 1991: 101-106

This article deals with the improved design of spiral-wound ultrafiltration and reverse-osmosis membrane elements which allows their use in processing of high-fouling solutions. CSA

1318

Taoukis (PS), Fu (B) and Labuza (TP). **Time-temperature indicators.** *Food Technology* 45(10): 1991: 70, 72-82

Aspects covered in this article are the importance of temp. during food distribution, classification of indicators (critical temp. indicators, critical temp./time indicators and time-temp. indicators (TTI)), types of commercial TTIs (diffusion-based indicator, enzymatic indicator and polymerization reaction-based indicator), consumer-readable TTIs, correlation of TTIs with shelf-life (direct correlation and kinetic approach), application of TTIs (monitoring distribution, managing inventory, indicating quality on shelf-life and predicting food safety), limitations and potential solutions of TTIs (cost, reliability and applicability). CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

1319

Kohler (B), Lambing (K), Neurohr (R), Nagl (W), Popp (FA), Wahler (J). **Photon emission - a new method for scanning the "quality" of food.** *Deutsche Lebensmittel-Rundschau* 87(3): 1991: 78-83 (De)

1320

Kulkarni (AS), Khotpal (RR), Lokhande (AR) and Bhakare (HA). **Glycolipid composition of subabul, ritha and kusum seed oils of Vidarbha region.** *Journal of Food Science and Technology (India)* 29(3): 1992: 179-181

The chloroform-methanol (2:1, v/v) extracted lipids from Subabul, (*Leucaena leucophala*), Ritha (*Sapindus mukorossi*) and Kusum (*Schleichera trijuga*) seeds were subjected to silicic acid column chromatography. The glycolipids obtained by acetone elution were separated by TLC into monoglucosyl diacylglycerol (MGDG) 22 to 28%, diglucosyldiacylglycerol (DGDG) 42 to 43%, steryl glucoside (SG) 13 to 16%, acylatedsterylglucoside (ASG) 14 to 17% and unidentified components 1 to 3%. The predominant fatty acids of individual glycolipids were found to be palmitic, stearic, oleic and linoleic acids. Glucose was identified as the sugar moiety in all the fractions. The ratio of sugar:sterol was 1:1 for SG and that of sugar:sterol:fatty acids was 1:1:1 for ASG. AS

1321

McGuire (J) and Krishdhasima (V). **Surface chemical influences on protein adsorption kinetics.** *Food Technology* 45(12): 1991: 92-96

Aspects covered in this article are protein adsorption (surface-induced conformational changes, bilayer adsorption, some consistent observations from adsorption equilibrium experiments and adsorption kinetic experiments), identifying rate constants (solid-surface chemical influences on β -lactoglobulin adsorption kinetics, quantifying molecular influences on protein adsorption kinetics) and optimizing surface-fluid contact. CSA

Chemistry(Analytical)

1322

Abdul-Hamid (J), Beh (SK), Donlan (AM), Moody (GJ) and Thomas (JDR). **Sterilization with /Sup 60/Cobalt γ -radiation of immobilised enzyme membranes for use in electrodes for food analysis.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 323-326

1323

Karovicova (J), Polonsky (J) and Simko (P). **Determination of preservatives in some food products by capillary isotachopheresis.** *Die Nahrung* 35(5): 1991: 543-544

FOOD MICROBIOLOGY AND HYGIENE

1324

Arakawa (S), Ishihara (H), Nishio (O) and Isomura (S). **A sandwich enzyme-linked immunosorbent assay for k-carrageenan determination.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 135-140

High titre antisera to k-carrageenan were produced by immunisation of rabbits and guinea pigs with k-carrageenan. These antisera, rabbit serum as a capture antibody and guinea pig serum as a detector antibody, were used in a sandwich enzyme-linked immunosorbent assay. The range of detn. of k-carrageenan was from 16 to 256 ng ml⁻¹ in the assay. The antisera showed no cross-reactivity with six thickeners. The assay was developed for application to foods such as jelly and custard pudding and demonstrated many advantages including high sensitivity, technical simplicity and the minimal requirement for food sample preparation before assay. AS

Enzymes

1325

Ohnishi (M), Iwata (K), Tomita (T), Nishikawa (U) and Hiromi (K). **Kinetic properties of the *Rhizopus* gluco-amylase and *Bacillus* α -amylase, which are immobilized on cellulofine.** *Starch/Starke* 42(12): 1990: 486-489

1326

Behnke (U) and Schonfeld (A). **Investigation on the storage stability of a pectic enzyme preparation by estimation of the inactivation velocity at elevated temperatures.** *Die Nahrung* 35(5): 1991: 525-531 (De)

The storage stability of pectic enzyme preparation is determined utilising the increased inactivation at elevated temp. The estimated velocity constants are extrapolated to storage temp. in an Arrhenius-diagram. This enables a prediction of the long term stability of polygalacturonase and the by-enzyme xylanase within a short time. For pectin esterase this procedure is not applicable because of divergent inactivation course. AS

Microorganisms

Bacteria

Lactobacillus casei

1327

Naes (H), Chrzanowska (J) and Blom (H). **Partial purification and characterization of a cell wall bound proteinase from *Lactobacillus casei*.** *Food Chemistry* 42(1): 1991: 65-79

The proteinase has pH optima at 4.8 using haemoglobin and at 5.6 with casein substrate, temp. optimum at 35 - 37 C, inactivation after 20 min at 50 C, mol. wt. 150 000, sodium dodecylsulphate-polyacrylamide gel electrophoresis indicating a tetrameric composition and isoelectric point 4.8. Serine proteinase inhibit this enzyme whose activity is affected by metal-chelating compounds. The ions Ca²⁺ and Co²⁺ enhance proteinase activity which is suppressed by Zn²⁺ and Cu²⁺. The proteinase without exhibiting peptidase activity, poorly degrades synthetic substrates of other serine proteinases. SD

Fungi

Mushrooms

1328

Akobundu (ENT) and Eluchie (GU). **Quality characteristics of pork sausage containing mushroom (*Pleurotus tuber-regium*) and local spices.** *Journal of Food Science and Technology (India)* 29(3): 1992: 159-161

The effects of incorporating *usu* mushroom (*Pleurotus tuber-regium*) flour and local spices [uziza or West African black pepper (*Piper guineensis*) *ehuru* or West African nutmeg (*Monodora myristica*) and *uda* or Ethiopian pepper (*Xylopiia aethiopica*)] on the quality of cooked pork sausage were studied. Cooked pork sausages supplemented with 0 - 25% of *usu* mushroom flour were evaluated. Results revealed that *usu* mushroom incorporation increased cooking yield and ash content but decreased fat, protein, juiciness, colour, flavour and cohesiveness slightly. Objective textural evaluation with the Instron corroborated sensory results. The local spices did not affect sausage composition but produced acceptable and specific sausages. *Usu* mushroom incorporation up to 25% produced acceptable sausage. AS

1329

Basundhara Devi (Th) and Shantibala Devi (GA). **Nutrients in wild mushroom *Clitocybe multiceps* (Peck).** *Journal of Food Science and Technology (India)* 29(3): 1992: 189-190

Nutrients (proteins, amino acids, sugar, vitamins and fat) were estimated during the peak growing season from June to August in *Clitocybe multiceps*. The analyses were done separately on pileus and stipe which contain more of the nutrients. Pileus contains higher amounts of proteins, amino acids, ascorbic acid, thiamine and fat than the stipes, while sugar content is higher in stipes. Though the contents of nutrients in pileus and stipes are different, total contents of nutrients in mushroom are higher than other edible wood-rotting mushrooms of Manipur. AS

Hygiene

1330

Giese (JH). **Sanitation: The key to food safety and public health.** *Food Technology* 45(12): 1991: 74-80

This report discusses about the proper plant design for sanitation, the function and application of detergents (alkaline detergent, acid detergent and detergent auxiliaries), sanitizers, halogens and

surfactants (chlorine compounds, iodine compounds, quaternary ammonium compounds, acid-anionic sanitizers, and hot water and steam) and cleaning equipment and systems (manual aids, high pressure systems, foam cleaning systems, clean-out-of-place techniques, clear-in-place systems and sanitizer application equipment). It also discusses the impact that new products and processes have had on sanitary practices. CSA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

Antioxidants

1331

Uhl (JC) and Eichner (K). **The effect of natural antioxidants on the stability of methyl linoleate in model systems.** *FAT Science Technology* 92(9): 1990: 355-361 (De)

This paper presents a model system based on linoleic acid methylester on potato starch which allows to estimate the antioxidative effects of certain additives in oxygen-sensitive foods of low lipid content. It is shown that a tocopherol mixture from natural sources (COvi-Ox T70) and an extract from rosemary (RM) were much more effective than the conventional ascorbyl palmitate (AP). So concn. of 2 p.p.m. COvi-Ox T70 or 20 p.p.m. RM respectively, were more effective than 200 p.p.m. AP. Reducing intermediates of the Maillard reaction (Amadori compounds) do not show antioxidative effects in all cases; in this investigations only fructose- γ -aminobutyric acid and fructose-arginine were able to retard linoleic acid oxidation to some extent; however, in the latter case, the free amino acid showed a similar effect. The antioxidative effect of the different additives tested is due to their radical scavenging character; only AP was able to reduce the hydroperoxides arising from autoxidation processes to the corresponding hydroxy compounds which cannot be decomposed to rancid products anymore. AS

Emulsifiers

Lecithin

1332

Penny (C). **Lecithin - nature's versatile emulsifier.** *Food* (5): 1991; 10, 12-15

CEREALS

1333

Klemm (H), Fretzdorff (B) and Bolling (H). **Evaluation of grain soundness using dehydrogenase activity determination.** *Getreide-Mehl und Brot* 44(11): 1990; 323-326 (De)

1334

Seibel (W). **3, DLG quality test of cereal based food.** *Getreide-Mehl und Brot* 44(11): 1990; 333-334 (De)

1335

Lupton (JR) and Yung (K-Y). **Interactive effects of oat bran and wheat bran on serum and liver lipids and colonic physiology.** *Cereal Foods World* 36(9): 1991; 827-831

Results of this study shows that the mixing of wheat bran with oat bran does not reduce the hypocholesterolemic effect of oat bran. Instead, the greater the amount of oat bran in the diet, the greater the hypocholesterolemic response. Similarly, any negative effects of oat bran on colonic physiology are not overcome by addition of wheat bran. Rather, the greater the amount of oat bran, the greater the hyperproliferative response. BV

Barley

1336

Anjum (FM), Ali (A) and Chaudhry (NM). **Fatty acids, mineral composition and functional (bread and chapathi) properties of high protein and high lysine barley lines.** *Journal of the Science of Food and Agriculture* 55(4): 1991; 511-519

Six barley lines derived from crosses involving Hiproly (SV 73608 x Mona 5) and Riso 1508 with higher yield recipients V 4342 and V 5681, along with the four parents, were analyzed for fatty acids and mineral composition. Dough properties, bread and chapathies were characterized by blending barley line (B 82503) at 2.5 - 25% with bread wheat flour (Pak 81). Fatty acid contents were myristic acid, 0.60 - 1.16%; palmitic acid, 16.68 - 20.84%; stearic acid, 1.30 - 3.33%; oleic acid 16.19 - 19.11%;

linoleic acid, 50.13 - 57.67%; linolenic acid 5.90 - 8.33% and degree of unsaturation 1.40 - 1.50%. The derived lines contained similar amounts of essential fatty acids. Significant variation for Mg, Cu, Zn, P and K was observed but overlapped among the lines and parents. The Ca, Fe and Mn showed non-significant differences among lines and parents. Blending up to 10% barley flour with bread wheat flour gave farinograph characteristics comparable to those of pure wheat flour, but increasing the proportion of barley beyond this decreased the mix time and dough stability. Bread baking tests verified that up to 10% barley could be mixed with wheat without adversely affecting loaf volume and other quality attributes. For chapathi making up to 20% barley could be blended into the wheat, yet yield acceptable quality. AS

Oats

1337

Shinnick (FL), Mathews (R) and Ink (S). **Serum cholesterol reduction by oats and other fiber sources.** *Cereal Foods World* 36(9): 1991; 815-821

This paper presents an overview of the effects of dietary fiber and fiber sources on serum cholesterol concn., with emphasis on the results of human clinical studies of oats and oat bran. 102 references. BV

Rice

1338

Noomhorm (A) and Yubai (C). **Effect of tropical environmental conditions on rice kernel breakage during milling.** *Journal of the Science of Food and Agriculture* 55(4): 1991; 521-528

Rough rice (*Oryza sativa* L. Suphan-60 var. of Thailand) samples subjected to environmental conditions of 20 - 35 C and RH of 40 - 90% during milling showed that the head rice yield (3.5, 1.26 and 1.65%) decreased with increase in milling environment temp. at different RH (40, 60 and 80% respectively) conditions. The results also showed that the highest head rice yield of 55.30 - 56.01% were obtained at 70 - 80% RH and in the range of 20 - 25 C temp. During tempering treatment kernel temp. rise during milling was reduced by 2.2 C and 2.87 C for 2 and 3 passes, respectively, a head rice yield increase of 0.95 - 1.12% was observed. Increasing the number of passes from 1 - 3 during milling results in a lower kernel temp. rise and higher yield of 2.08 and 1.30% for with and without tempering respectively. BV

Rice bran

1339

Saeki (A). **Production of rice vinegar from uncooked rice bran by a parallel-combined process consisting of saccharification, ethanol fermentation and acetic acid fermentation.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991: 418-421 (Ja)

An improved method was developed for production of rice vinegar from uncooked ricebran by a parallel-combined process consisting of enzymatic saccharification, ethanol fermentation with acetic acid tolerant fermentation with acetic acid tolerant yeast and acetic acid fermentation with acetic acid bacteria. An acid stable glucoamylase from *Rhizopus* sp. which is able to produce glucose enzymatically from raw starch in the presence of acetic acid was chosen for the purpose. In addition to a common acetic acid bacteria, *Saccharomyces ludwigii* which demonstrates a normal ability of ethanol fermentation in 1% acetic acid was selected as an acetic acid tolerant yeast. In the actual process of rice vinegar fermentation, these three independent steps were allowed to act at a time in one mash batch containing 12-14% (w/v) of uncooked rice-bran, and incubation was carried out as static culture through the process. As a result, the newly developed method was evaluated to be superior to classic conventional methods on the acetic acid yield. AS

Rice starch

1340

Ragheb (A), Refai (R), Abd El-Thalout (I) and Hebeish (A). **The combined effect of oxidation and carbamoylethylation on the rheological properties of maize and rice starches.** *Starch / Starke* 42(11): 1990: 420-426

The combined effect of oxidation and etherification on the mol. structure of starch was investigated. Maize and rice starches were used. Oxidation was affected using sodium hypochlorite while etherification was performed by reacting starch with acrylamide in presence of sodium hydroxide; this reaction is known as carbamoylethylation. The extent of the latter, expressed as % N, was found to increase by decreasing the mol. size of starch through oxidation. The carbamoylethyl starches so obtained could be precipitated by ethanol and they are soluble in water irrespective of the kind of starch. On the other hand, results of rheological properties indicated that they are governed mainly by the mol. size of starch. Oxidized starches with relatively high mol. size exhibit thixotropic behaviour. The degree

of thixotropy decreases and changes into pseudoplasticity as the mol. size of starch decreases. The results also indicated that at constant rate of shear the apparent viscosity of carbamoylethyl starches decreases as the mol. size decreases. Furthermore, the rheological properties of carbamoylethyl starch pastes undergo considerable changes and so does the apparent viscosity when these pastes were stored for 3 days. AS

Rye

Rye flour

1341

Dorfer (J). **Rheological investigations with rye flour-suspensions and application of hemicellolytic enzymes.** *Getreide-Mehl und Brot* 44(11): 1990: 330-332 (De)

Wheat

1342

Perkowski (J), Chelkowski (J) and Wakulinski (W). **Mycotoxins in cereal grain. Part 13. Deoxynivalenol and 3-acetyl-deoxynivalenol in wheat kernels and chaff with head fusariosis symptoms.** *Die Nahrung* 34(4): 1990: 325-328

1343

Chelkowski (J), Cierniewska (A) and Wakulinski (W). **Mycotoxins in cereal grain. Part 14. Histochemical examination of Fusarium-damaged wheat kernels.** *Die Nahrung* 34(4): 1990: 357-361

1344

Edwards (JP), Short (JE) and Abraham (L). **Large-scale evaluation of the insect juvenile hormone analogue fenoxycarb as a long-term protectant of stored wheat.** *Journal of Stored Products Research* 27(1): 1991: 31-39

Wheat grains treated with fenoxycarb (at 4.2 or 8.2 mg/kg a.i) and chlorpyrifos-methyl (at 3.9 mg/kg a.i) were infested with 300 adults of each of *Tribolium castaneum*, *Oryzaephilus surinamensis*, *Rhyzopertha dominica* and *Sitophilus granarius* at 0, 6, 12 and 18 months. Grain samples were examined at 3 month intervals for the presence of insects, grain quality and the level of pesticide residue in the grain. The grain samples were also assessed for milling and baking quality and insecticide residues in white flour, bran and baked white bread. Chlorpyrifos-methyl treated grain controlled *O. surinamensis* for 9 months, *R. dominica* and *T. castaneum* for 12 months, and *S. granarius* for 15 months. Grains treated with fenoxycarb at 4.2

mg/kg controlled populations of *O. surinamensis*, *R. dominica* and *T. castaneum* for 2 yr, but was not completely effective at controlling populations of *S. granarius*. Grain treated with fenoxycrab at 8.2 mg/kg controlled populations of all 4 sp. for the entire 2 yr period of the trail. Grain quality and breadmaking properties were good when insect population were kept low. Chlorpyrifos-methyl and fenoxycrab residues were low in white flour and baked white bread, but residues were markedly higher in bran. BV

1345

Kaushal (KS) and Ashok (KS). **Effect of *Sitophilus oryzae* infestation on *Aspergillus flavus* infection and aflatoxin contamination in stored wheat.** *Journal of Stored Products Research* 27(1); 1991: 65-68

Moisture content, *Aspergillus flavus* infection, and aflatoxin production were investigated in 6.5 kg lots of wheat infested by *Sitophilus oryzae* and/or *A. flavus* at harvest and during 3 months storage in metal pots. The grain moisture content and *A. flavus* infection rates increased throughout the storage period and were greatest in wheat lots infested with both *S. oryzae* and *A. flavus*. Insect infestation correlated with increased aflatoxin production. Toxin producing strains of *A. flavus* were isolated from wheat grains and internally from the weevils. AS

1346

Hocking (AD) and Banks (HJ). **Effects of phosphine fumigation on survival and growth of storage fungi in wheat.** *Journal of Stored Products Research* 27(2); 1991: 115-120

Moist wheat grain (a_w 0.80, 16.2% moisture content (mc) and 0.86 a_w , 18.3% mc) inoculated with *Eurotium chevalieri*, *Aspergillus flavus* or *Asp. parasiticus* was exposed to 0.1 g phosphine m^{-3} for 2 wks at 28 C. Most fungi showed less development in phosphine fumigated wheat than air during storage. The level of inhibition observed suggests that phosphine may be useful in retarding fungal spoilage during short-term storage of high moisture grain (15 - 19% m.m for wheat). Phosphine at 0.1 g m^{-3} caused only a slight decrease in populations of fungi that were unable to grow at the a_w of the stored grain, indicating that phosphine has only a small effect on non-growing mycelium and dormant conidia. BV

1347

Singh (PP), Battu (RS), Jola (BS) and Kalra (RL). **Absorption of DDT and HCH residues by wheat during storage in rural houses treated with these**

insecticides for malaria control. *Journal of Stored Products Research* 27(2); 1991: 131-134

Wheat kept in gunny bags of 20 kg capacity in rural houses sprayed with DDT and HCH for mosquito control was found to acquire the residues of these insecticides up to 4.40 or 22.14 mg kg^{-1} , respectively, during an 8 month storage period. Wheat stored in sealed polyethylene bags of 20 kg capacity also absorbed residues of these insecticides up to 3.17 and 14.12 mg kg^{-1} , respectively. Samples kept in gunny or polyethylene packets of 100 g capacity absorbed DDT and HCH residues at levels higher than those kept in bags of 20 kg size. This may be due to their relatively large surface area available for exposure to the ambient environment. Absorption of residues of DDT and HCH by wheat stored in sealed polyethylene bags suggests that considerable transference of these insecticide residues can occur through vapour phase. Thus, the potential exists for the contamination of food commodities with substantial amounts of residues during their storage in rural premises treated with insecticides for malaria control and this may have significant implications in the regulation of insecticide residues in foods. AS

1348

Bryden (WL), Mollah (Y) and Gill (RJ). **Bioavailability of biotin in wheat.** *Journal of the Science of Food and Agriculture* 55(2); 1991: 269-275

The bioavailability of biotin in wheat was determined by ileal digestibility in chickens. Only less than or equal to 12% of the vitamin was available in a range of wheat cvs, in contrast to almost 100% in maize. Grinding wheat or adding oat hulls to a wheat-based diet did not improve the digestibility. The low digestibility of biotin was not associated with the biotin concn., or other characteristics of the wheat grain. It was concluded that low availability in wheat results from the inability of birds to liberate biotin from wheat in a form suitable for absorption. AS

1349

Manju Gupta, Neelam Khetarpaul and Chauhan (BM). **Effect of Rabadi fermentation of HCl-extractability of minerals of wheat.** *Food Chemistry* 42(1); 1991: 111-117

Freshly ground wheat flour-buttermilk mixture fermentation at 30 - 40 C, 6 - 48 h showed that temp. of fermentation and HCl extractability of minerals increased with period, and non-phytate P and inorganic P concn. in fermented product increased with decreased phytate P. Phytic acid and HCl-extractability of minerals showed significant negative correlation. SD

1350

Welpert (D). **Continuous assessment of rheological properties of wheat doughs during heat setting as a recording baking test.** *Getreide-Mehl und Brot* 44(8): 1990: 227-231 (De)

1351

Zwengelberg (H). **Colour measurement of durum wheat and milled products from durum wheat.** *Getreide-Mehl und Brot* 44(11): 1990: 339-345 (De)

1352

Grestenkorn (P). **Correlation between colour measurement and quality criterions of durum wheat.** *Getreide-Mehl und Brot* 44(11): 1990: 350-351 (De)

Wheat flour

1353

Prugarova (A) and Kovac (M). **Investigation on lead and calcium binding to gluten proteins of wheat flour.** *Die Nahrung* 34(1): 1990: 103-104

1354

Nierle (W), El Baya (AW) and Brummer (J-M). **Effect of emulsifying lipids on baking quality of wheat flour.** *Getreide-Mehl und Brot* 44(11): 1990: 327-330 (De)

Wheat starch

1355

Nierle (W) and El Baya (AW). **Lipids and rheological properties of starch. Part II. The effect of granule surface material on viscosity of wheat starch.** *Starch/Starke* 42(12): 1990: 471-475

1356

Nierle (W) and El Baya (AW). **Lipids and rheological properties of starch. Part I. The effect of fatty acids, monoglycerides and monoglyceride ethers on pasting temperature and viscosity of wheat starch.** *Starch/Starke* 42(7): 1990: 268-270

MILLETS

Corn

1357

Dendy (J), Dobie (P), Saidi (JA), Smith (J) and Uronu (B). **Trials to assess the effectiveness of new synthetic pheromone mixtures for trapping (*Prostephanus truncatus* (Horn))**

(Coleoptera-Bostrichidae) in maize stores. *Journal of Stored Products Research* 27(1): 1991: 69-74

Traps containing pheromone ((1-methylethyl (E)-2-methyl-2-pentenoate) (T₁) and oate) (T₂) mixtures had trapped more beetles than those containing T₁ alone although significant differences could not be shown between any of the mixtures tested. The current monitoring system could possibly be improved by using a mixture of T₁ and T₂ as the pheromone lure. T₁ was released faster from the vials than T₂, but at least 10% of each component remained after 2 wks exposure. It is however recommended that lures were renewed every 2 wks when used with *P. truncatus* trap. BV

1358

Li (Li) and Arbogast (RT). **The effect of grain breakage of fecundity, development, survival and population increase in maize or *Tribolium castaneum* (Herbst) (Coleoptera: Tenebrionidae).** *Journal of Stored Products Research* 27(2): 1991: 87-94

The intrinsic rate of increase in a field population of *Tribolium castaneum* on undamaged grain, commercial grain, cracked grain and maize flour was estimated at 30 C, 75% rh. Egg production of *T. castaneum* on the above media was significantly different and the ranking can be expressed as flour > cracked maize > commercial maize > undamaged maize. Developmental rates and survival rates were significantly higher on flour and cracked maize than on commercial grain and undamaged grain. On commercial grain, populations could increase twenty times per generation. Although damage to grain is not absolutely necessary for young larvae to survive and for females to lay eggs, fecundity was reduced to a min., survival was very low, and development was delayed on undamaged grain. Population increase would thus be so reduced that populations may decline to extinction. Previous infestation by other species may help initial infestation of whole kernels by *T. castaneum*, although the results of this study showed that *T. castaneum* can develop on whole maize kernels alone under optimal conditions. AS

1359

Throne (JE). **Equilibrium moisture content of cracked and whole corn (maize).** *Journal of Stored Products Research* 27(2): 1991: 129-130

The equilibrium moisture contents of finely cracked; medium cracked; coarsely cracked; whole damaged; and whole, undamaged corn kernels were determined at 43 and 75% RH and 30 C. Cracked and whole corn equilibrated to the same moisture

contents. This indicates that differences in progeny production of *Cryptolestes ferrugineus* in an earlier study were not caused by differences in equilibrium moisture content of the types of corn used. AS

1360

Coulter (LA) and Lorenz (K). **Extruded corn grits-quinoa blends: I. Proximate composition, nutritional properties and sensory evaluation.** *Journal of Food Processing Preservation* 15(4): 1991: 231-242

Quinoa blended with corn grits at 10, 20 and 30% levels produced unprocessed and extruded products with higher protein, fiber, ash, amino acids; greater nitrogen solubility, lower *in vitro* digestibility and acceptability. SD

1361

Coulter (LA) and Lorenz (K). **Extruded corn grits-quinoa blends: II. Physical characteristics of extruded products.** *Journal of Food Processing Preservation* 15(4): 1991: 243-259

Blending of quinoa with corn grits at 10, 20 and 30% levels extruded at 15 and 25% moisture using screws with 1:1 and 3:1 compression ratio indicated that 15% initial moisture and 3:1 compression ratio gave favourable products with greater expansion, lower density and shear strength. Scanning electron microscopy, the blended product (with 30% quinoa) showed a rough texture, many broken cell walls and less evenly distributed air cells. SD

1362

Bressani (R). **Protein quality of high-lysine maize for humans.** *Cereal Foods World* 36(9): 1991: 806-811

This review covers essential amino acid content in normal and high-lysine maize, protein quality of high-lysine maize in human subjects (N balance in children and adult), protein quality values in human subjects, growth studies and nutritional benefits of improved protein quality of maize and acceptability and nutritional impact. 39 references. BV

Corn starch

1363

Sreenath (HK) and BeMiller (J). **Effect of pullulanase and α -amylase on hydrolysis of waxy corn starch.** *Starch/Stärke* 42(12): 1990: 482-486

Using commercial pullulanase, α -amylase and their mixture, partial hydrolysis of waxy corn starch was characterised for optimising production of

maltodextrins free of D-glucose. Compared to pullulanase or α -amylase alone, the mixture of these two (simultaneous or successive addition) on the substrate enhanced the efficiency of maltodextrin turnover with low or traces of D-glucose production in a short time. D-glucose was removed from dextrins by membrane filtration and the yield of dextrin above DP6 was 60 - 65%. AS

1364

Komiya (T), Yamada (T), Imai (K), Hisamatsu (M), Masui (H), Kawakishi (S). **Study on interaction of corn starch and γ -cyclodextrin with lipid peroxide.** *Starch/Stärke* 42(10): 1990: 394-397

The deterioration of corn starch and γ -cyclodextrin (γ -CD) as a model compound by coexisting of methyl linolate (ML) has been studied in the solid system. With the elapse of oxidation time of ML, the reducing values of above the sugars increased and the value of γ -CD with Silica Gel done more largely than without the one. The mol. wt. of corn starch may decrease slightly, the glycosidic linkages of amylopectin and amylose molecules in the starch may be cleaved partially and the crystalline structure of the starch will be deteriorated a little by some active radicals formed by the autoxidation of ML. The propagative autoxidation of ML induced the deterioration of γ -CD giving the two processes of the hydrolysis and the depolymerization in the similar way as observed in the reaction of γ -CD with OH radicals. AS

Pearl millet

1365

Kheterpaul (N) and Chauhan (BM). **Effect of natural fermentation on phytate and polyphenolic content and *in vitro* digestibility of starch and protein of pearl millet (*Pennisetum typhoides*).** *Journal of the Science of Food and Agriculture* 55(2): 1991: 189-195

Natural fermentation at 20, 25 and 30 C for 72 h brought about a significant reduction in phytic acid content of pearl millet (*Pennisetum typhoides* Rich) flour. The phytate content was almost eliminated in the flour fermented at 30 C. An increase in polyphenol content of fermented flour was noticed, the higher the temp. of fermentation the greater was the increase in polyphenol content of pearl millet. An improvement in starch as well as protein digestibility (*in vitro*) was noticed at all the temp. of natural fermentation, the highest being at 30 C. AS

Sorghum

1366

Satish Kumar (L), Prakash (HS), Shetty (HS) and Malleshi (NG). **Influence of seed mycoflora and harvesting conditions on milling, popping and malting qualities of sorghum (*Sorghum bicolor*)**. *Journal of the Science of Food and Agriculture* 55(4): 1991: 617-625

Grains of sorghum cvs (SPV-386, SPV-475, CSH-9 and CSH-5) harvested at physiological maturity stage possessed superior malting and milling qualities whereas late-harvested grains exhibited better popping characteristics. Milling and popping reduced the seed mycoflora (*Fusarium moniliforme*) considerably. BV

PULSES

1367

Kotaru (M), Iwami (K), Yeh (H-Y) and Ibuki (F). **Resistance of cranberry bean (*Phaseolus vulgaris*) α -amylase inhibitor to intraluminal digestion and its movement along rat gastrointestinal: Further investigation using a radioactive probe and specific antiserum**. *Food Chemistry* 42(1): 1991: 29-37

Cranberry bean (*Phaseolus vulgaris*) α -amylase inhibitor (CBAl) was treated with [14 C]HCHO and NaBH₄ for modification of lysyl E-amino group and its reductive methylation did not affect the susceptibility to digestive enzymes and its immunoreactivity with rabbit antiserum. The bulk of the inhibitor without undergoing digestion, absorption, much loss of antigenicity and radioactivity, passed through the small intestine. SD

1368

Emefu (EE), Ojmelukwe (PC) and Mbata (GN). **Effect of insect infestation on the proximate composition and functional properties of flour samples and protein isolates from bambarra groundnut and cowpea**. *Journal of Food Science and Technology (India)* 29(3): 1992: 174-176

The proximate composition of flour samples obtained from infested and uninfested cowpea *Vigna unguiculata* and bambarra groundnut *Voandzela subterranea* seeds were determined. The results revealed that infested flour sample from both seeds had lower protein and fat contents but higher ash content than uninfested samples. The emulsion capacity, foam capacity and foam stability of the flour, protein isolates and protein fractions of

uninfested cowpea demonstrated better emulsification and foaming characteristics than those of bambarra groundnut. In all cases, insect infestation seeds reduced the foaming and emulsification properties of flours. AS

1369

Lombardi-Boccia (G), Lullo (GD) and Carnovale (E). **In vitro iron dialysability from legumes: Influence of phytate and extrusion cooking**. *Journal of the Science of Food and Agriculture* 55(4): 1991: 599-605

In vitro iron dialysability from five Italian legumes (mottled bean, white bean, faba bean, chickpea, lentil) and the influence of phytate and extrusion cooking on it were evaluated. Iron dialysability was 2.3 and 2.4% in mottled and white bean respectively, 1.2% in faba bean, 2.7% in chickpea and 1.1% in lentil. After extrusion cooking the flours showed a marked iron contamination and a decrease in iron dialysability, but these changes were significant only for mottled bean. Enzymic phytate removal induced an increase in iron dialysability > 100% in all the raw legumes except mottled bean which showed an increase of only 57%. This finding indicates that, although phytate consistently modifies iron dialysability, it is difficult to identify a quantitative relationship between phytate content and iron dialysability. AS

1370

Ashenafi (M) and Busse (M). **Growth potential off *Salmonella infantis* and *Escherichia coli* in fermenting tempeh made from horsebean, pea and chickpea and their inhibition by *Lactobacillus plantarum***. *Journal of the Science of Food and Agriculture* 55(4): 1991: 607-615

Salmonella infantis and *Escherichia coli* multiplied to varying degrees during the fermentation of unacidified horsebean, pea and chickpea tempeh. Active mycelial growth on the beans resulted in a sharp increase in pH. This was always accompanied by a sharp increase in the growth rate of the test organisms. Acidification of the beans during soaking decreased the growth rate of the test organisms only until active mycelial growth started. Inoculation of cooked beans with *Lactobacillus plantarum* resulted in a complete inhibition of *E. coli* in unacidified and acidified chickpea tempeh and acidified pea tempeh. Marked inhibition of *E. coli* was also noted in unacidified pea tempeh and acidified horsebean tempeh. *S. infantis* was also completely inhibited by *L. plantarum* in unacidified and acidified chickpea tempeh. In pea and horsebean tempeh, counts of *S. infantis* were always lower in *lactobacillus*-inoculated fermenting beans than in the control. Beside the pH, undissociated

acids and other substances produced by *L. plantarum* may be inhibitory to the test organisms. The use of *L. plantarum* may be considered for the control of pathogens during commercial-scale tempeh production. AS

1371

Simmi Dhawan and Gurmukh Singh. **Studies of sev preparation from blends of Bengal gram flour, defatted soy flour and rice flour.** *Beverage and Food World* 18(4): 1991: 18-20

Chickpea

1372

Umaid Singh, Subrahmanyam (N) and Jagdish Kumar. **Cooking quality and nutritional attributes of some newly developed cultivars of Chickpea (*Cicer arietinum*).** *Journal of the Science of Food and Agriculture* 55(1): 1991: 37-46

Kabuli (cream seed coat) cv was generally preferred to desi (brown seed coat) cv in terms of cooking time and sensory properties. Ca content was noticeably higher in desi than in kabuli cvs, whereas Mg, Fe, Cu, and Zn showed no definite trend. Lysine, threonine, methionine and cysteine of these genotypes were within the range of FAO values. Desi and Kabuli showed no noticeable difference in protein and amino acids. Biological value was considerably higher for Kabuli than for desi; and contained more utilisable protein and may be nutritionally better than desi. BV

Faba beans

1373

Schmandke (H), Schultz (M), Schmidt (G), Schneider (Ch) and Andersson (O). **Tension of oil-water interface and properties of O/W emulsions in dependence of faba bean globulins.** *Die Nahrung* 34(4): 1990: 363-368

Compared with faba bean globulin the improved flow, gelifying, surface and emulsifying properties of aqueous solution of the corresponding acetylated derivatives are reflected in O/W emulsions by their enhanced stability. AS

1374

Schwenke (KD), Prah (L), Danilenko (AN), Grinberg (VJ) and Tolstoguzov (VB). **'Continuous' conformational change in succinylated faba bean protein isolates.** *Die Nahrung* 34(4): 1990: 399-401

1375

Donath (R) and Kujawa (M). **Study on the degradation of vicin and convicin in *Vicia faba* flour by selected bacteria strains.** *Die Nahrung* 35(5): 1991: 449-453 (De)

Three hour incubation of *Vicia faba* with *Streptococcus faecalis* convicin was converted completely and vicin to about 95%. BV

Lupins

1376

Jimenez (MD), Cubero (JI) and De Haro (A). **Genetic and environmental variability in protein, oil and fatty acid composition in high-alkaloid white lupin (*Lupinus albus*).** *Journal of the Science of Food and Agriculture* 55(1): 1991: 27-35

1377

Zaror (VG), Acevedo (GB), Soto (EY) and Imbarack (RU-D). **Tolerance and chronic acceptability evaluation of lupin (*Lupinus albus* var. Multolupa) flour in young adults.** *Archivos Latinoamericanos de Nutricion* 40(4): 1990: 490-502 (Fr)

Cookies enriched with sweet lupin flour were tested for their acceptability and tolerance in young adults, and compared with control cookies. A number of hematological, hepatic and renal tests were performed, as well as the measurement of allergic response, in order to detect possible changes induced by lupin. The study included 31 young adults assigned to two groups which comprised males and females, with mean ages of 26 plus or minus 6.5 and 27 plus or minus 5.9 yr respectively. The protein and energy intakes of the subjects were calculated, prior to the study, using the methods of dietary history and the 24 h recall method. The subjects were free of any abnormalities detectable by medical history, physical examination, biochemical and hematological tests. Body wt. and height were measured before the beginning of the study. The ratio wt./height of the individuals was calculated using the Jelliffe's standards. The mean values for the calorie and protein intakes were 1,919 kcal (SD plus or minus 655) and 59.3 g (SD plus or minus 22.7). The calorie contents of the control and experimental cookies were 507 and 610 kcal respectively, while the protein contents were 8.4 g and 24.1 g, respectively. The body wt. of subjects in both groups increased significantly during the study ($P < 0.01$ and $P < 0.02$). No significant changes were recorded for other anthropometric parameters, except for the tricipital skinfold ($P < 0.01$). Changes observed in hematological parameters were judged to be unrelated to lupin flour. The acceptability and tolerance to high levels of lupin flour were good. The above-mentioned results show that sweet lupin flour

is a good and safe source of energy and protein for adults. AS

Winged beans

1378

Gatehouse (AMR), Howe (DS), Flemming (JE), Hilder (VA) and Gatehouse (JA). **Biochemical basis of insect resistance in winged bean (*Psophocarpus tetragonolobus*) seeds.** *Journal of the Science of Food and Agriculture* 55(1): 1991: 63-74

Insect *Callosobruchus maculatus* feeding trials were carried out in which winged bean seed protein fractions were incorporated at a range of concn. into artificial seeds, and their effects on the development of *C. maculatus* was studied. Both albumin and globulin fractions were found to be toxic to the developing larvae and their toxicity correlated with their hemagglutinating activity. Assay of psophocarpin A, B and C fractions demonstrated that psophocarpin B to be the most insecticidal and to contain the highest haemagglutinating activity. Purified basic seed lectin was highly insecticidal to *C. maculatus* larvae, with an LC_{50} value of C, 3.5 gkg^{-1} . Winged bean trypsin inhibitor had no deleterious effects upon development. BV

OILSEEDS AND NUTS

Coconuts

1379

Leufstedt (G). **Opportunities for future diversification of the coconut industry.** *Oleagineux* 45(11): 1990: 505-508

This paper presents alternatives for a diversification of the coconut industry into new food products. Aspects covered include: coconut industry, coconut oil, desiccated coconut, coconut milk, high value coconut products and hygienic processing of coconuts. BV

Mustard

1380

Aguilar (C), Rizvi (SSH), Ramirez (JF) and Inda (A). **Rheological behaviour of processed mustard. I. Effect of milling treatment.** *Journal of Texture Studies* 22(1): 1991: 59-84

Slightly coarse, standard and fine samples of processed mustard showed unimodal population based particle size distributions described by the population mode but on volume basis bimodal

distributions described by their population-mode (smaller size group of particles) and the volume mode (larger size). Coarser sample showed larger size volume mode, higher apparent viscosity of nonmixed samples, Bingham yield stress and plastic apparent viscosity, shear stress constant and coeff. of thixotropic breakdown from the Weltman stress decay model, yield stress and consistency index from the Herschel-Bulkley mode and storage and loss moduli which can show the effect of manufacturing practices on long term storage stability of the product. SD

1381

Aguilar (C), Rizvi (SSH), Ramirez (JF) and Inda (A). **Rheological behaviour of processed mustard. II. Storage effects.** *Journal of Texture Studies* 22(1): 1991: 85-103

Slightly coarse, standard and fine samples of processed yellow mustard were stored at 5, 25 and 45 C for 3 months at 45 C caused in all the samples syneresis and aggregation of colloidal particles. The fine sample showed in syneresis even at 25 C. Increase in population mode increased apparent viscosity, flow behaviour index from the Herschel-Bulkley model and exponent from the loss modulus power law equation, and decreased Bingham yield stress, plastic apparent viscosity, shear stress constant from the Weltman stress decay model, yield stress, and consistency index, exponent from the storage modulus power law equation and min. values of loss tangent. In heterodisperse semi-solid foods the syneresis which is time and temp. dependent may be minimized by particle size distribution. SD

Rapeseeds

1382

Klepacka (M). **Infrared spectroscopic study of interactions between phytate and protein in rapeseed.** *Acta Alimentaria* 19(4): 1990: 295-304

Extracts (0.2% NaOH), supernatants and isolates were prepared from meals of three varieties of rapeseed (classical, low erucic acid and double improved) and were used to study the interaction between protein and phytates by infrared spectroscopy. Significant differences in the intensity band at 1090 cm^{-1} in the IR spectra of samples were observed. This may be attributed to the effect of the combination of P with negatively charged proteins. Protein complexed with phytates appeared both in basic (pH 9.5) and acid environments (supernatants II pH 3.0 - 4.1). AS

1383

Kozłowska (H), Zadernowski (R), Nowak (H) and Piskula (M). **The influence of selected technological processes on the improvement of rapeseed meal and flour feed quality. Part I. The influence of hydrothermal treatment and ethanol extraction on chemical composition of rapeseed products.** *Die Nahrung* 35(5): 1991: 485-489

As the majority of noxious compounds in rapeseed (glucosinolate, phenolic compounds and other non-investigated ones) are well soluble in alcohol, an attempt was made to establish to which extent it is possible to eliminate these compounds from flour with 80% alcohol and to which extent hydrothermal treatment increases the extraction efficiency. The results of the chemical composition of the differently treated products from the double-improved Jantar var. show, that hydrothermal treatment of whole seeds results in easier extraction of the major part of the compounds analysed. But under the influence of the applied processes protein denaturation changes may take place. AS

Rapeseed flour

1384

Mothes (R), Schwenke (KD) and Grossmann (S). **Modified method of phytic acid analysis in rapeseed flour.** *Die Nahrung* 34(1): 1990: 99-101

Rapeseed proteins

1385

Mothes (R), Schwenke (KD), Zirwer (D) and Gast (K). **Rapeseed protein - polyanion interactions. Soluble complexes between the 2 S protein fraction (napin) and phytic acid.** *Die Nahrung* 34(4): 1990: 375-385

The formation of electrostatic complexes between the low molecular mass basic rapeseed protein fraction (napin) and phytic acid was studied using turbidity, potentiometry, gel chromatography, gel electrophoresis, dynamic light scattering and circular dichroism spectroscopy. In the first step insoluble "substoichiometric" complexes are formed in which the positive charge of the protein are not completely neutralized. Soluble negatively charged oligomeric complexes are formed with an excess of phytic acid. Protein dimers dominate over the monomer and small amounts of higher oligomers. Dimers and larger soluble aggregates are the main components after heating. The critical phytic acid-protein ratio for solubilizing the system represents the threshold value for the heat-stabilizing effect of phytic acid. Complexing with phytic acid does not influence significantly the secondary structure of the protein. Buffers and

neutral salts weaken the phytic acid binding to the protein and decrease the molecular mass of the complexes. AS

Sal seeds

1386

Tharanathan (RN), Changala Reddy (G) and Muralikrishna (G). **Physico-chemical characteristics of starches from sal (*Shorea robusta*) and dhupa (*Vateria indica*) seeds.** *Starch/Stärke* 42(7): 1990: 247-251

Pure, white starches were isolated in ~30% yields from defatted sal and dhupa meals. Both starches consisted of granules of varying size and shape characteristics, and contained considerable amounts of protein and lipid constituents. C 18:1, C 16:0 and C 18:0 were the major fatty acids present in both free and bound lipid fractions; whereas the latter in addition contained C 18:2 (~20%). Both starches exhibited two-stage swelling in water; for sal starch the solubility was marked by lower but its swelling power was considerably higher. In DMSO the sal starch was readily soluble but not dhupa starch (only ~20% solubility). The hot paste viscosity as well as set back viscosity of dhupa starch was much higher in comparison to those by sal starch. Very highly purified sal starch virtually exhibited no hot paste viscosity, and behaved like amylopectin-rich material. The latter had only 1.5% amylose as against of ~24% in original sal starch. X-Ray powder patterns revealed sal starch to be of A-type and dhupa starch to be of B-type. Both the starch granules were susceptible for *in vitro* attack by human salivary α -amylase. AS

Soybeans

1387

Horvath (E) and Crukor (B). **Functional properties and protein extractability of dielectric heated soybeans.** *Die Nahrung* 34(4): 1990: 337-343

Soybeans with innate moisture (10%) and with moisture of 20% were treated in a dielectric heater up to final temp. of 107 C and 127 C respectively. Functional properties and protein extractability of soybeans were determined. Water absorption capacity increased, fat absorption capacity, emulsifying properties and Nitrogen Solubility Index of soy decreased after dielectric heating. The extractability of proteins by the methods of Osborne as well as Than and Shibasaki also decreased. The buffer containing sodium dodecyl sulphate and 2-mercapto-ethanol, could disrupt a part of bondings resulted during dielectric heat treatment. AS

atunde-Dada (GO). Some physical properties of
in soybean varieties and effects of processing
ion levels and availability. *Food Chemistry*
2(1): 1991; 89-98

en Nigerian soybean var. analysed showed 6.01 -
50% seed coat, 6.95 - 15.34% leached solids, 99.3
197.7% swelling capacity, 1.82 - 2.36 g/cm³ seed
density and comparable iron levels of the whole,
hulled and cooked soybeans. Roasting did not
fluence dialyzable iron. Dehulling decreased
significantly diffusibility of iron. Dialyzable iron in
defatted flour was 2.26%, in soy conc. 2.12%, in soy
olate 2.49% after 2 h pancreatic digestion and 3.91
13.6% in home-made products. Germination and
fermentation enhanced iron. SD

389

athmann (K), Morsel (J-Th) and Grunert (S).
studies on activity determination of
lipoxygenases from soybean. *Die Nahrung* 34(1):
1990; 29-35 (De)

lipoxygenases play an important role in the
evaluation of oil and oilseed quality. In this paper
selective detn. of their isoenzymes with easy
analytical methods is reported. Literature methods
are tested and optimized to evaluate their
applicability. The separate detn. of L-1, L-2 and L-3
isoenzymes by a UV photometric method is
described using as an example soya lipoxygenase.
oleic acid (pure and in mixtures) was the
substrate of all oxidation reactions. The relative
error of the detn. of isoenzymes is about 2%. AS

390

attar (A), Neelofar and Akhtar (MA). Effect of
radiation and soaking on phytate content of
soybean. *Acta Alimentaria* 19(4): 1990; 331-336

Phytate content of soybeans decreased significantly
with increasing soaking time (3 - 12 h) and
irradiation dose (0.25 - 1.00 kGy). The rate of
phytate removal was generally greater during
soaking at 50 C than at ambient temp. (P < 0.01).
Loss of phytate was more on soaking in distilled
water than in tap water. Irradiation doses
independently decreased the original phytate (212.0
mg/100 g) to a range value of 182.5 - 102.5 mg/100
g, while soaking in tap and distilled water for 12 hr
to 78.9 - 109.5 mg/100 g and 73.7 - 87.5 mg/100
g, respectively. Combination treatment resulted in
greater destruction of phytate than either one. Max.
destruction of phytate content (from 212.0 to 37.5
mg/100 g) occurred on soaking at 50 C of 1.0 kGy
sample in distilled water. BV

soy products

1391

Das (HK), Lambrev (A), Te (JE), Akterian (S) and
Tantchev (S). Response surface modelling of
extrusion texturing of defatted soya grits. *Journal*
of Food Science and Technology (India) 29(3): 1992;
141-146

Effects of barrel temp. (die end), die temp., screw
compression ratio, screw speed and feed moisture
on expansion ratio, per cent water absorption,
breaking strength, density and colour of extrudates
including extruder mass flow rate during
single-screw extrusion of defatted soya grits were
studied using response surface methodology (RSM).
Results were graphed as response surfaces showing
areas of optimum extrusion processing parameters.
A combination of high barrel and die temp. not
favoured expansion. Low feed moisture level
provided good expansion. It is evident that RSM is
an useful technique in extrusion modelling. AS

Soy curd

1392

Changade (SP) and Tambat (RV). Blending of soy
milk with buffalo milk for preparation of soy
curd. *Journal of Food Science and Technology (India)*
29(3): 1992; 191-192

Soy milk (SM) was blended with buffalo milk (BM)
with 6% fat in different combinations viz. 100% BM,
25% SM, + 75% BM, 50% SM + 50% BM + 25% BM
and 100% SM. The av. values for sp. gr. ranged from
1.019 to 1.036, for viscosity from 1.3943 to 2.5337
cp and for fat from 1.02 to 6.00%. However, curd
strength ranged from 6.40 to 39.40 g, total solids
7.91 to 16.38%, pH 4.24 to 5.00 and acceptability of
product scored from 3.12 to 7.24 points out of 9
points. All the properties except pH showed
decrease in the av. values with the increase in the
proportion of SM in blends. The quality evaluation
expressed that 25% SM + 75% BM curd was at par
with the curd from 100% BM and superior over other
blends. The curd evaluation score for 50% SM +
50% BM, 75% SM + 25% BM and 100% SM was
statistically at par. AS

Soy milk

1393

Wang (SH) and Toledo (MCF). Evaluation of the
nutritional value of soy milks prepared from
beans treated by microwaves. *Archivos*
Latinoamericanos de Nutricion 40(4): 1990; 572-587

Soy milk prepared from microwave treated soybeans
showed lower protein, fat, ash and total solid

contents, as compared to a control milk prepared from soybeans not processed by microwaves. The soy milk obtained from soybeans with 8.7% initial moisture, treated by microwaves for 240 seconds, had the best total chemical score and the highest apparent methionine availability, as well as PER. The complete inactivation of the trypsin inhibitor activity was achieved with the milk prepared from soybeans with 56.8% initial moisture subjected to microwave treatment for 180 seconds. The soy milk obtained from soybeans with 38.8% initial moisture, processed by microwaves for 180 seconds resulted to have the highest, *in vitro*, protein digestibility. BV

1394

Reddy (PV) and Mital (BK). **Physical and chemical characteristics of soy milk.** *Journal of Food Science and Technology (India)* 29(3): 1992: 193-194

The physical and chemical characteristics of soy milk prepared from different varieties of soybean were determined. The colour of milk prepared from different varieties ranged from whitish to greyish white. The ranges of different characteristics for various soy milk samples were: total solids 5.16 - 5.96%, protein 2.38 - 2.95%, pH 6.3 - 6.7%, titratable acidity 0.13 - 0.17, sp. gr. 1.01 - 1.03, viscosity 4.5 - 5.0 cp, surface tension 102.10 - 111.79 dynes/cm and freezing point -0.7 - 0.8 C. AS

Soy proteins

1395

Hoshi (Y). **Effect of moisture-sorption on gelation of commercial soy protein isolate.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5): 1991: 411-413 (Ja)

Effect of moisture-sorption on gelation of a commercially available soy protein isolate (SPI) was investigated. After the SPI was dispersed in water, the protein sample was lyophilized and stood for 1 day at 100% of rh and 50 C. Hardness and cohesiveness of a gel obtained from the SPI sample by heating at 90 C for 30 min in 0.01 M Tris-HCl buffer (pH 8.0) after moisture-absorption were increased by 12% and 32%, respectively., compared with those of the gel obtained only by heating (heated gel). When the buffer containing 0.5 M NaCl was used, the hardness was increased by about 6 times and the cohesiveness decreased to approx. 80% of those of the moisture-induced gel obtained in the absence of NaCl. However, it was observed that both texture parameters were higher by 22% (hardness) and 51% (cohesiveness), respectively., than those of the heated gel. AS

1396

Hwang (JK), Kim (YS) and Pyun (YR). **Comparison of the effect of soy protein isolate concentration on emulsion stability in the absence or presence of monoglyceride.** *Food Hydrocolloids* 5(3): 1991: 313-317

Emulsion stability (ES) was enhanced with increasing soy protein isolate (SPI) in the absence of monoglyceride. In the presence of 0.5% (w/v) of monoglyceride, ES was max. at 0.2% (w/v) of SPI concn. and at higher levels reduction was observed. The optimum hydrophile-lipophile balance concept to account for the stability of oil-in-water emulsions was suggested. SD

Sunflower

1397

Decherf-Hamey (S), Mimouni (B), Raymond (J) and Azanza (JL). **Partial characterization of polypeptide components of sunflower (*Helianthus annuus* L.) seed albumin fraction.** *Die Nahrung* 34(4): 1990: 387-398

The albumin fraction of sunflower seed (*Helianthus annuus*, cv. Mirasol) is a family of water soluble basic polypeptides which constitutes about 20% of the seed proteins. This fraction, isolated by selective isoelectric precipitation of globulins, has been studied in detail by sodium dodecyl sulphate gel electrophoresis, non equilibrium pH gradient electrophoresis and combination of these techniques using non reducing and reducing conditions. The molecular mass of the main polypeptides was markedly different between unreduced (12,000 to 16,500 g.mol⁻¹) and reduced from (100,000 to 18,000 g.mol⁻¹). As shown by NEPHGE mobility of these polypeptides was also altered by reduction. From these results and other observations it is concluded that the stability of the globular structure of some polypeptides is dependent on the presence of intact disulphide crosslink(s). By multidimensional gel electrophoresis it was shown that the polypeptide components of each molecular mass classes displayed a high heterogeneity in net charge. Thus ion exchange chromatography procedures allowed only partial separation of different polypeptidic groups. Their amino acid composition shows that some of these fractions are, on the basis of their lysine and sulphur containing amino acids, of nutritional interest. AS

TUBERS AND VEGETABLES

1398

Kochar (GK) and Sharma (KK). **Fibre content and its composition in commonly consumed Indian**

Mean percentage of dietary fibre as neutral detergent fibre (NDF) on dry matter basis was highest in green leafy vegetables (22%) followed by other vegetables. Fruits which are eaten with outer peel and seed were rich in cellulose (63 - 71%). Vegetables and fruits which are eaten without outer peel and seed had high contents of hemicellulose (51 - 79%). AS

Carrots

1399

Ahmed (EM), Mirza (S) and Arreola (AG). **Ultrastructural and textural changes in processed carrot tissue.** *Journal of Food Quality* 14(4): 1991: 321-330

Carrot slices (raw, thermally processed and frozen/thawed) were tested by transmission electron microscope and instron. In frozen/thawed sample, cell walls were intact and dense, middle lamella lost pectic materials and cells and were not so closely pressed as raw sample. The modulus of deformity and stiffness for frozen/thawed and thermally processed carrots was comparable while toughness for the latter significantly lower. The results indicated that different areas of carrot tissue behave differently to thermal processing. SD

Cassava

1400

Bradbury (JH), Egan (SV) and Lynch (MJ). **Analysis of cyanide in cassava using acid hydrolysis of cyanogenic glucosides.** *Journal of the Science of Food and Agriculture* 55(2): 1991: 277-290

Guided by the results of NMR experiments on the reactivity of linamarin in alkali and acid, an acid hydrolysis method was developed for cyanide analysis in cassava. Hydrolysis in 2.0 M H₂SO₄ at 100 C for 50 min of a cassava extract produced cyanohydrins which rapidly decomposed to cyanide ion in alkali. Excess pH 6 buffer was added, followed by chloramine-T and pyridine/barbituric acid (Konig reaction) to produce a purple solution which was measured spectrophotometrically at 583 nm. The colour intensity depended on pH and phosphate concn., hence accurate results required similar solution conditions for KCN standards. The method gave reasonable agreement with results obtained by the use of linamarase, and adequate recoveries of added linamarin (70 - 95 degree dependent on conditions). Acid hydrolysis is cheaper than the enzymic method using linamarase, which is expensive. Also the pyridine/barbituric acid

reagent used in the acid hydrolysis method is cheaper and more stable than the pyridine pyrazolone normally used in the enzymic method. Six locally grown cultivars gave < 30 mg HCN kg⁻¹ fresh tuber, and one cv (SM 1 - 150) contained only 4 mg HCN kg⁻¹ fresh weight. Analyses of the same cv grown more recently gave values of 13 - 27 mg HCN kg⁻¹, showing the need for a study of the environmental factors influencing the cyanide content of cassava tubers. AS

1401

Akingbala (JO), Oguntimein (GB) and Abass (AB). **Effect of processing methods on quality and acceptability of fufu from low cyanide cassava.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 151-154

The effects of steeping whole and grated tubers and of periodic change of water during steeping on the quality and acceptability of fufu from low-cyanide cassava were evaluated. Steeping increased the acidity and reduced the pH and cyanide content of cassava. Grating the tuber before steeping improved aroma, and periodical change of water during steeping improved taste, colour and texture of fufu over that produced by the traditional method. Fufu from low-cyanide cassava had an acceptability similar to that of fufu from high-cyanide cassava. However, oven drying of the flour significantly reduced acceptability of fufu. AS

Turnips

1402

Perkins-Veazie (PM) and Collins (JK). **Colour changes in waxed turnips during storage.** *Journal of Food Quality* 14(4): 1991: 313-319

Turnip (*Brassica campestris* L. var. *rapifera*) roots were stored (unwaxed, waxed in vented plastic bags and cardboard boxes) for 6 wks. Turnips stored in plastic bags showed reduced wt. loss. The chroma of white portion increased regardless of package or wax. The external purple colour was unstable. SD

Potatoes

Potato starch

1403

Muhrbeck (P) and Eliasson (A-C). **Influence of the naturally occurring phosphate esters on the crystallinity of potato starch.** *Journal of the Science of Food and Agriculture* 55(1): 1991: 13-18

1404

Bayazeed (A) and Trauter (J). **Investigation on changes in physical and technological properties of water soluble sizing agents during the ultrafiltration process. Part II. Ultrafiltration of carboxyl methyl (potato) starch.** *Starch/Starke* 43(7): 1991: 262-272

Vegetables

1405

Padmavati (K), Udipl (SA) and Rao (M). **Effect of different cooking methods of β -carotene content of vegetables.** *Journal of Food Science and Technology (India)* 29(3): 1992: 137-140

β -carotene contents of 12 raw vegetables and 35 cooked preparations were estimated by column chromatography and spectrophotometry. The effect of different cooking methods was investigated by calculating the % loss in the cooked preparations. The extent of loss was lower when processing/heating was kept to a min. Cooking methods when used cumulatively such as grinding, chopping plus cooking for long periods or prolonged cooking resulted in progressive losses of β -carotene. Deep-frying resulted in twice the amount of loss that occurred during shallow-frying. AS

1406

Mann (SK), Harvinder Kaur and Tejinder Gulati. **Effect of cooking on fibre content of vegetables.** *Journal of Food Science and Technology (India)* 29(3): 1992: 185-186

The fibre (neutral detergent fibre (NDF), acid detergent fibre (ADF), hemicellulose, cellulose and lignin) fractions of raw and cooked vegetables were determined. The NDF, ADF and cellulose contents of raw and cooked vegetables were found to be significantly ($P < 0.05$) different. Further, in order to find out an alternate method to freeze-drying, two drying temp. (50 C and 100 C) were used to dry the samples. Lignin content significantly increased ($P < 0.05$) in the samples when dried at 100 C as compared to 50 C thus resulting in higher value of total fibre. BV

1407

Fujita (S), Tono (T) and Kawahara (H). **Purification and properties of polyphenol oxidase in head lettuce (*Lactuca sativa*).** *Journal of the Science of Food and Agriculture* 55(4): 1991: 643-651

Polyphenol oxidase (EC 1.10.3.1) in head lettuce (*Lactuca sativa* L.) was purified by ammonium sulphate fractionation, ion exchange chromatography and gel filtration. The enzyme was

found to be homogenous by polyacrylamide gel electrophoresis. The mol. wt. of the enzyme was estimated to be about 56 000 amu by Sephadex G-100 gel filtration. The purified enzyme quickly oxidised chlorogenic acid (5-caffeoyl quinic acid-) and (-)-epicatechin. The K_m values for the enzyme, using chlorogenic acid (pH 4.5, 30 C) and (-)-epicatechin (pH 7.0, 30 C) as substrate, were 0.67 mM and 0.91 mM, respectively. The optimal pH of chlorogenic acid oxidase and (-)-epicatechin oxidase activities were 4.5 and 7.8, respectively, and both activities were stable in the pH range 6 - 8 at 5 C for 20 h. Potassium cyanide and sodium diethyldithiocarbamate markedly inhibited both activities of the purified enzyme. The inhibitory effect of metallic ions such as Ca^{2+} , Mn^{2+} , Co^{2+} and Ni^{2+} for chlorogenic acid oxidase activity was stronger than that for (-)-epicatechin oxidase activity. AS

1408

Giami (SY). **Effects of pretreatments on the texture and ascorbic acid content of frozen plantain pulp (*Musa paradisiaca*).** *Journal of the Science of Food and Agriculture* 55(4): 1991: 661-666

The effects of water blanching, steam blanching, microwave blanching and calcium chloride pretreatment on the physical and sensory properties and ascorbic acid content of frozen plantain (*Musa paradisiaca* L) pulp was studied. After freezing and reheating, the microwave treatment produced a similar texture to that obtained with calcium chloride treatment, and both were significantly ($P < 0.01$) better than conventional water or steam blanching. Microwave treatment improved retention of ascorbic acid. AS

FRUITS

1409

Lu (JY), Stevens (C), Khan (VA), Kabwe (M) and Wilson (CL). **The effect of ultraviolet irradiation on shelf-life and ripening of peaches and apples.** *Journal of Food Quality* 14(4): 1991: 229-305

Peaches were (cv. Loring and Elberta) and Golden Delicious apples irradiated with UV (254 nm) to doses of 0.84×10^4 to 40×10^4 erg/mm² and stored for 10 and 20 days at 12 C and 30 days at 20 - 25 C respectively in dark room. In UV treated peaches fruits were firmer and showed lower pH and soluble solids and higher acidity while in UV treated apples lower pH, higher acidity and ascorbic acid was noticed. In general UV treatment reduced storage rot and delayed ripening. SD

1410

Rahman (SMM), Mosihuzzaman (M) and Westerlund (E). **Free sugars and dietary fibre in some fruits of Bangladesh.** *Food Chemistry* 42(1); 1991: 19-28

Ten varieties of seasonal fruits of Bangladesh (litchi, horbori, amloki, bangi, tarmuj, jamrul, kalajam, jalpai, karamcha and papaya) were analysed for polysaccharide constituents (water soluble non-starch as well as water-insoluble non-starch), dietary fibre and free sugars which are useful to evaluate the nutritional status of the fruits. SD

1411

Carbonell (E), Costell (E) and Duran (L). **Rheological behaviour of sheared jams. Relation with fruit content.** *Journal of Texture Studies* 22(1); 1991: 33-43

Eight jam samples, strawberry, peach, plum and apricot at 50% and 30% fruit content were sheared. The time dependence of flow was eliminated and Casson's yield stress values obtained at two ranges of shear rates. Flow rate was adequately described by the Herschel and Bulkley model and significant differences in some of rheological parameters were found between samples of 50% and 30% fruit content. The results indicate that the change in these parameters could be used as indices of fruit content in jams. SD

1412

Hobbs (MC), Easterbrook (KM) and Melton (LD). **Cell wall material composition of mealy fruit among ripening nectarines.** *Journal of the Science of Food and Agriculture* 57(1); 1991: 141-145

Nectarines (*Prunus persica* cv Fantasia) after storage at 2 C for 27 days were sampled before and after ripening at 20 C for 7 days. The fruit population at 7 days' ripening was divided into two categories. At one extreme there were normally ripe fruit and at the other extreme fruit were mealy. Cell wall material, isolated from the 3 samples, was separated into CDTA- and Na₂CO₃-soluble and Na₂CO₃-insoluble fractions. A loss of uronic acid from the cell wall material during ripening was observed, but there was no difference between normal and mealy fruit. The neutral sugar content of cell walls was determined by GLC and there was an indication that differences in the relative amount of xylose and galactose existed between normal and mealy fruit. Gel permeation chromatography showed that there were minimal differences in the degree of polymerisation of pectic polymers isolated from normal and mealy fruit. AS

1413

Lal Kaushal (BB) and Chauhan (GC). **Advances in grading, packaging and marketing of fruits.** *Beverage and Food World* 18(4); 1991: 11-12

Apples

1414

King (K). **Characteristics of pectinesterase isolated from Bramley apple waste.** *Journal of the Science of Food and Agriculture* 57(1); 1991: 43-48

Pectinesterase was isolated from Bramley apple waste (peel, cores and offcuts) and its characteristics were determined. Optimum pectinesterase activity was obtained between pH 7.0 and 9.5 and activity was still detectable at 5.0. The enzyme was stable over a wide pH range in the presence of substrate, with over 90% of the activity retained after 5 min at pH 2.5. Pectinesterase activity increased with temp. up to 60 C. Activation energy was calculated at 32 kJmol⁻¹K⁻¹ between 20 and 50 C. Optimum activity was obtained in sodium chloride concn. between 0.025 and 0.20 M with activity declining at higher salt concn. A K_m of 0.044% apple pectin and a V_{max} of 9.52 units g⁻¹ DM were obtained for one specific enzyme extract. AS

Avocados

1415

Pardo (MES), Moreno (AO) and Alvarez (LD). **The effect of ethylene diamine tetracetic acid on preserving the colour of an avocado puree.** *Journal of Food Processing Preservation* 15(4); 1991: 261-271

Avocado purees with different concn. of EDTA to preserve colour showed that in 6 months storage concn. form 300 - 350 p.p.m. EDTA preserved the green colour and diminished pheophytin. SD

Bananas

1416

Agravante (JU), Matsui (T) and Kitagawa (H). **Sugars and organic acids in ethanol- and ethylene-treated banana fruits.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5); 1991: 441-444

Ripening of banana was accelerated by 2 - 3 days with application of 60% ethanol (10 ml/12 fruits). However, 1000 p.p.m. ethylene induced more rapid ripening changes: in peel colour, sugars and organic acid contents. Sucrose, glucose and fructose were identified by HPLC. All the three sugars increased with ripening and sucrose was predominant at all

stages of ripeness. The increase in sucrose preceded that of glucose and fructose and the ratio of glucose-fructose was almost constant during the course of ripening, i.e., from initial (green) until 9 or 14 days of storage. Malic and citric acids were present in almost equal amounts in green fruits (initial). Malic acid increased 2 to 3.6 times the initial level, becoming the predominant acid in ripe fruits. Citric acid increased only in overripe and senescent fruits. AS

Citrus

1417

Miyake (M), Inaba (N), Nakayama (K), Maeda (H) and Ifuku (Y). **Screening of microorganisms for degrading citrus processing wastes.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5); 1991: 398-404 (Ja)

Microorganisms which degrade citrus processing wastes were screened. Screening was designed to obtain strains which degrade the waste effectively, so that the residue can be easily dehydrated and its vol. and wt. reduced. Two hundred and forty three strains were isolated on a medium consisting of citrus peel, colong tea and coffee extracted wastes. Two sp. each of yeast and mold were characterized. They were identified as *Hansenula* sp. (Y-2), *Candida* sp. (Y-11), *Byssoschlamys* sp. (M-9) and *Aspergillus* sp. (M-21). The optimum temp. for growth was 40, 35, 45 and 40 C resp. The optimum pH was approx. 6.0. These organisms grew better on glucose, fructose, maltose and sucrose than on other carbon sources tested. Yeast extract was the most effective nutrient for the growth of these organisms. AS

1418

Miyake (M), Inaba (N), Nakayama (K), Maeda (H) and Ifuku (Y). **Degradation and volume-reduction of citrus processing wastes by microorganisms.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5); 1991: 405-410 (Ja)

Citrus peels supplemented with rice bran and several nutrients were degraded on a lab. scale by 4 sp. of isolated organisms, *Hansenula* sp. Y-2, *Candida* sp. Y-11, *Byssoschlamys* sp. M-9 and *Aspergillus* sp. M-21. The peel mixture was incubated at pH 6.0, 40 C for 5 days. *Byssoschlamys* sp. M-9 was the most effective organism for reducing the wt. and vol. of the peel, which reducing rate was 54.3% and 29.6%, respectively. During 5 days incubation, the cell masses of *Byssoschlamys* sp. M-9 and *Aspergillus* sp. M-21 increased during the first 4 days. However, the cell numbers of *Hansenula* sp. Y-2 and *Candida* sp. Y-11 increased during the first

2 days and remained relatively constant thereafter. Hesperidin, one of the useful citrus constituents, remained constant throughout the degradation process. Therefore it was suggested that hesperidin was extracted more effectively from the degraded product than from the untreated peels. AS

CONFECTIONERY, STARCH AND SUGAR

1419

Gans (DA). **Sucrose and delinquent behaviour: Coincidence or consequence ?.** *CRC Critical Reviews in Food Science and Nutrition* 30(1); 1991: 23-48

Review. 153 references. SRA

Confectionery

Chocolates

1420

Keller (SE), Nash (TC), Newberg (SS) and Shazer (WH). **The degradation of aspartame in chocolate milk related to processing conditions and subsequent microbial load.** *Journal of Dairy Science* 74(4); 1991: 1214-1217

The rate of aspartame degradation was measured in sterile chocolate milk and compared with the rate of aspartame degradation in inoculated chocolate milk. These degradation rates were then compared with rates determined in chocolate milk produced in a pilot plant. All samples were monitored on a weekly basis to follow the change in pH, percentage of titratable acidity, microbial population, and aspartame concn. The half-life of aspartame in sterile milk was found to be up to 60% longer than that of HTST-processed chocolate milk. The rate of aspartame degradation in chocolate milk was found to be related to initial microbial load and subsequent growth of contaminants. AS

Starch

1421

Soni (PL), Sharma (H), Srivastava (HC) and Gharia (MM). **Physicochemical properties of *Canna edulis* starch - comparison with maize starch.** *Starch/Stärke* 42(12); 1990: 460-464

Starch from the rhizomes of *Canna edulis* was isolated, purified and its physico-chemical properties are compared with maize starch. Scanning electron microscopy of the granules show that they are oval to elliptical in shape. It has low

contents of lipids, ash and proteins, and has significantly higher content of amylose. It displays low water-binding capacity and gelatinization temp. Swelling and solubility are higher when compared with maize starch. Brabender viscosity of *C. edulis* starch is more than three times higher than maize starch and has shown no thinning. It retrogrades more than maize starch. AS

1422

Gomez (MH), Waniska (RD) and Rooney (LW). **Effects of nixtamalization and grinding conditions on starch of masa.** *Starch/Stärke* 42(12): 1990: 475-482

Starches from corn and sorghum masas were solubilized in water and their mol. characteristics were studied with high-performance, size-exclusion chromatography (HPSEC). Rheological properties of masa (smoothness, plasticity and cohesiveness) that are developed during lime-cooking, steeping and grinding of cereals were correlated to the starch solubility. Corn and sorghum were processed at different cooking times and grinding conditions; and the starch in masa was extracted with water at 85 C and 120 C for HPSEC analysis. Starches from corn and sorghum masas were affected in a similar way by the nixtamalization process; however, sorghum starch was more soluble than corn starch in flour and masa. Alkaline-cooking, steeping and stone-grinding did not depolymerize the cereal starch. All masas contained < 10% soluble solids of which 30 to 50% was starch solubilized. Soluble solids increased with longer cooking time and finer grinding. About 50% of the insoluble starch, which remained in the particulate solids of masas was solubilized in water at 120 C. The remaining starch was indispersible because either the starch remained inside endosperm pieces or inside gelatinized and retrograded gels. Several granular and mol. forms of starch were present in masa as a result of partial gelatinization, i.e. uncooked, swollen, and annealed starch granules, and soluble and retrograded amylose. Retrogradation of starch polymers occurred during steeping of cooked corn and during cooling of masa after grinding. Masa, a unique dough system, resulted from a network of starch polymers, uncooked and partially gelatinized starch granules supporting the rest of the kernel components into continuous phase of water. AS

1423

Varadharaju (N), Balasubramanian (M) and Parvathy (K). **Studies on the mechanical roasting of sago.** *Journal of Food Science and Technology (India)* 29(3): 1992: 177-178

An electrically heated mechanical sago roaster with an output of 100 kg/h was developed. The roasting

of sago was carried out at 12 temp. levels from 110 to 220 C with roasting time of 2 to 5 min. Stability, clustering, moisture and swelling were determined. A roasting at 170 C for 3 min was found to be most satisfactory as it had less clustering and high stability. AS

Sugars

1424

Hartel (RW) and Shastry (AV). **Sugar crystallization in food products.** *CRC Critical Reviews in Food Science and Nutrition* 30(1): 1991: 49-112

A review of recent literature on crystallization of the commercial sugars (fructose, glucose, lactose and sucrose) is presented. Topics include: nucleation, growth and effects of impurities and additives. 190 references. SRA

Lactose

1425

Smart (J), Haylock (S) and Gordon (M). **Lactose - an underutilized food ingredient.** *Food Australia* 43(9): 1991: 386-388

BAKERY PRODUCTS

1426

Chakraborty (MM). **Speciality fat products for bakeries and edible products.** *Indian Food Industry* 10(5): 1991: 27-32

Aspects covered in this review article are the history of shortening products, technologies with advanced shortening formulations, classification of shortenings, speciality baking shortening, fluid shortening (process technology and its development in the US), the application of shortenings in cakes and yeast raised products, yellow cake mix and chocolate cake mix shortening, margarines and spreads and the formulation of margarine oil blends. 7 references. CSA

1427

Ajit Joshi. **Snack foods: Yet to satisfy Indian palates.** *Beverage and Food World* 18(4): 1991: 15-17.

Covers definition of 'snack', world snack food markets (extruded snacks), Indian scene (chips and extruded products), noodles and others. BV

1428

Brochetti (D), Penfield (MP) and Heim-Edelman (MF). **Yeast bread containing distillers' dried grain: Dough development and bread quality.** *Journal of Food Quality* 14(4): 1991: 331-344

Commercial distiller's dried grain (DDG) contains 51.1% total dietary fibre and 25.8% protein and is more acidic, absorbed more water and oil than bread and whole wheat flours. Its substitution from 5 to 20% showed decrease in mixogram peak height and development angles, increase in peak time and decrease in loaf volume as DDG level increased. The quality difference by a trained panel showed significant deviation from the ideal multigrain bread. SD

1429

Huang (SD) and Miskelly (DM). **Steamed bread - a popular food in China.** *Food Australia* 43(8): 1991: 346-347, 350, 351

Aspects covered include: the demand for quality of wheats, steamed bread, production of steamed bread (mixing of dough, fermentation, neutralisation, moulding, proofing, steaming, quantity requirements for steamed bread) and future research. SRA

1430

Wei Lin and Lineback (DR). **Changes in carbohydrate fractions in enzyme-supplemented bread and the potential relationship to staling.** *Starch/Starke* 42(10): 1990: 385-394

White breads were prepared with and without bacterial α -amylase. Breads containing α -amylase became firm (staled) more slowly than did those without the added enzyme. Larger quantities of carbohydrate were extracted from enzyme-supplemented breads. The additional carbohydrate was mainly branched-chain material with an average chain length (CL) of 19 - 24. Thus, the α -amylase acts on starch during baking to form predominantly branched-chain polymers of lower mol. wt. These polymers apparently have a decreased ability to retrograde, interfere with the ability of amylopectin to retrograde after the bread is baked, or interfere with other interactions involved in firming, thus reducing the extent of firming (staling). AS

1431

Barber (B), Ortola (C) and Spicher (G). **Storage of wrapped bread. Part 2. Influence of sour dough and heat treatment on the sensoric quality of**

wheat bread. *Getreide-Mehl und Brot* 44(8): 1990: 235-241 (De)

1432

Venkateswara Rao (G), Savithri (GD) and Indrani (D). **Studies on the use of garlic in bread.** *Journal of Food Science and Technology (India)* 29(3): 1992: 147-149

Dough properties of wheat flour with the addition of 2, 4, 6 and 8% garlic extract showed a gradual adverse effect on the strength of the dough. As the garlic extract increased from 0 to 8%, farinograph dough stability decreased from 5.0 to 3.0 min and mixing tolerance index increased from 80 to 160 BU while mixograph and extensograph area values decreased from 69.6 to 52.5 cm² and 192 to 53 cm² respectively. Bread with garlic flavour and without any deleterious effect on its quality could be made with 2% addition of garlic extract. AS

1433

Indrani (D), Savithri (GD) and Venkateswara Rao (G). **Effect of onion extract on the rheological and bread making characteristics of wheat flour.** *Journal of Food Science and Technology (India)* 29(3): 1992: 150-152

Effect of adding 5, 10, 20, 30 and 40% onion extract to wheat flour on rheological and bread making characteristics has been studied. In general, dough properties with respect to strength and gas retention capacity were adversely affected gradually as the onion extract content increased in the dough from 0 to 40% as was evident from decrease in dough stability from 5.5 to 3.5 min, valorimeter value from 40 to 36 and increase in the mixing tolerance index from 80 to 160 BU of farinograph and the decrease in area values of mixograph and extensograph from 70.6 to 60.5 cm² and 111 to 85 cm² respectively. Consequently, the specific loaf volume of bread decreased from 3.4 to 3.0 ml/g. Bread with onion taste can be prepared with 20% incorporation of onion extract as the specific loaf volume (3.3 ml/g), the medium fine crumb grain and soft crumb texture were comparable to those of control bread. AS

Cake

1434

Guinot (P) and Mathlouthi (M). **Water vapour sorption hysteresis and the shelf-life of industrial sponge-cake.** *Acta Alimentaria* 19(4): 1990: 337-346

Addition of soy proteins at a level of 1% to sponge cake contributed to hysteresis stabilization. No significant effect of modified atm. (50% CO₂ - 50%

N₂) packaging was observed on water vapour sorption hysteresis. BV

Pasta

1435

Busch-Stockfisch (M), Wilhelmi (F) and Knaack (A-D). **Influence of exchange of saccharose against honey on baking technology and sensoric quality by production of the pastry in household standard make. Part 1. Short pastry.** *Getreide-Mehl und Brot* 44(8); 1990; 243-246 (De)

1436

Ronchetti (R). **Filled pasta pasteurization by means of a microwave continuous plant.** *Getreide-Mehl und Brot* 44(8); 1990; 249-252 (De)

1437

Siebel (W) and Zwingelberg (H). **Sensoric evaluation and colour measurement of milled products from durum wheat and durum wheat pasta.** *Getreide-Mehl und Brot* 44(11); 1990; 345-350 (De)

Puri

1438

Shurpalekar (SR) and Shukla (VK). **Characteristics of Puri dough and Puri based on wheat and composite flours.** *Journal of Food Science and Technology (India)* 29(3); 1992; 153-158

Brabender farinograph, General Food texturometer and WB shear press have been successfully adopted for the first time to study objectively the quality characteristics of *puri* dough and *puri* based on *atta* (whole wheat flour)/*malda* (refined wheat flour) with or without upto 33% of flours from maize (*Zea mays*), Bengalgram (*Cicer arletinum*) and jowar (*Sorghum vulgare*). Optimum processing conditions for the preparation of dough of desired consistency and *puri* arrived at were: (1) water requirement of the dough based on (i) *atta*: 67 plus or minus 2% (ii) *malda*: 52 - 54% and (iii) blends of *atta* and (a) maize or jowar flour: 63 plus or minus 1% and (b) Bengalgram flour (*Besan*) 60 plus or minus 1% (2) rolling of dough sheet to 2 mm thickness and 12.5 cm diam. yielding *puri* with full puffing (3) frying temp. and time: 180 plus or minus 2 °C and 25 - 30 second respectively. The texture and eating quality of *malda* based *puri* was inferior to that based on *atta*, but improved on incorporation of 5 - 10% bran; however its puffing was affected adversely. *puri* of good overall acceptability could be prepared from composite flours based on wheat *atta* blended with maize/jowar flours at 15% level or with Bengalgram flour at 20% level. AS

Rolls

1439

Shi (M), Brummer (J-M) and Seibel (W). **Optimisation of evaluation and quality of Chinese steamed rolls. Part 1. Standardisation of production and quality evaluation.** *Getreide-Mehl und Brot* 44(8); 1990; 233-235 (De)

MILK AND DAIRY PRODUCTS

1440

Holcomb (DN). **Structure and rheology of dairy products. A compilation of references with subject and author indexes.** *Food Microstructure* 10(1); 1991; 45-108

Bibliography. 882 references. SD

1441

Lehmann (D), Askari (Chr), Henn (D), Dettmar (F), Hener (U), Mosandl (A). **Simultaneous stereodifferentiation of γ - and δ -lactones.** *Deutsche Lebensmittel-Rundschau* 87(3); 1991; 75-77 (De)

The simultaneous stereodifferentiation of all aroma relevant 4(5)alkyl-substituted $\gamma(\delta)$ -lactones is described, using multidimensional GC and the column combination OV 1701/Octakis (3-O-butyryl-2,6-di-pentyl)- γ -cyclodextrin. The method is applicated to the lactone flavour compounds of different fruits and the advance to the analytical differentiation between "natural" and "nature-identical" aromas is demonstrated. AS

1442

Nag (KN), Radha Charan and Yusuf Ali. **Maintenance of hygienic and sanitary condition in meat production.** *Beverage and Food World* 18(4); 1991; 26, 28-29

Aspects covered include meat hygiene control, sanitation requirement, cleaning compound, sanitizers for meat plants, water supply, liquid waste disposed, rodent control, insect control, employees and equipment. BV

Milk

1443

Smithers (GW), Bradford (RS), Regester (GO) and Pearce (RJ). **New casein protein products for the food industry. Physical, chemical and enzymatic manipulation of milk.** *Food Australia* 43(6); 1991; 252-254

The manufacture of whole casein, as an alternative to acid and rennet casein is described, and a simple process for isolation of individual casein proteins, particularly β -casein is outlined. Unique nutritive and functional properties of the casein derived peptide, a proteolytic fragment of K-casein isolated from cheese whey, have facilitated development of foods for specialised therapeutic applications. SRA

1444

Singh (RK), Nielsen (SS), Chambers (JV), Martinez-Serna (M) and Villota (R). **Selected characteristics of extruded blends of milk protein raffinate or non-fat dry milk with corn flour.** *Journal of Food Processing Preservation* 15(4): 1991; 285-302

Milk protein raffinates (MPR) at different levels of lactose and non-fat dry milk powders co-extruded with corn-flour at 100, 125 and 150 C showed complete gelatinization of starch, affected water holding capacity, nitrogen solubility index and sorption characteristics of the extruded samples. Lower processing temp. decreased browning irrespective of the lactose levels in MPR. MPR at more than 5% level decreased the extrudate expansion ratio, increased at breaking strength of extrudate and finally reversing it but below 5% level improved the texture. SD

1445

Tamime (AY), Kalab (M), Davies (G) and Mahdi (HA). **Microstructure and firmness of labneh (high solids yoghurt) made from cow's, goat's and sheep's milks by a traditional method or by ultrafiltration.** *Food Microstructure* 10(1): 1991; 37-44

Labneh samples prepared by traditional method and ultrafiltration method and smoothened by lactic and homogenizer showed 20.5 - 22.5% total solids (including minerals and un-metabolized lactose), 6.7 - 8.2% protein and 7.8 - 8.9% fat. Since homogenization markedly decreased the firmness and increased the pore size, it is not recommended in industrial production. Structures by electron microscopy of goat's and sheep's labneh, being similar, was less uniform than cow's labneh. SD

1446

El-Kest (SE) and Marth (EH). **Injury and death of frozen *Listeria monocytogenes* as affected by glycerol and milk components.** *Journal of Dairy Science* 74(4): 1991; 1201-1208

A cell suspension of *Listeria monocytogenes* strains Scott A in phosphate buffer solution alone or with

added glycerol, milk fat, lactose, or casein was frozen and stored at -18 C. At suitable intervals, samples of cell suspensions were thawed at 35 C and plated on suitable media to distinguish between surviving injured and noninjured cells of *L. monocytogenes*. Glycerol (2 or 4%) protected *L. monocytogenes* from death and injury during frozen storage for up to 6 months; however, when 2% glycerol was present, 30 min of frozen storage had to elapse after completion of freezing before protection against death was evident. During short-term (2 wk or less) frozen storage, lactose, milk fat, and casein, each at 2%, provided better protection to *L. monocytogenes* than did 2% glycerol. During long-term frozen storage, milk components, each at 2%, protected *L. monocytogenes* against death and injury, but less than that provided by glycerol. Protection by lactose and milk fat against death during frozen storage was observed during 4 wk and against injury during 5 months and 4 wk of frozen storage, respectively. Protection by casein against death and injury occurred during frozen storage for up to 6 months. Salts that simulate milk ultrafiltrate provided almost no protection to *L. monocytogenes* during freezing and frozen storage. Increasing the concn. of milk fat from 2 to 4% resulted in almost no change in death of *L. monocytogenes*, but in a decrease in injury only during the first 24 h of frozen storage. A similar change in concn. of lactose resulted in an obvious decrease in death of *L. monocytogenes* during frozen storage for up to 6 months and in a decrease in injury only during the first 24 h of frozen storage. AS

1447

Pouliot (Y) and Boulet (M). **Seasonal variations in the heat stability of concentrated milk: Effect of added phosphates and pH adjustment.** *Journal of Dairy Science* 74(4): 1991; 1157-1162

Natural variations in heat stability of 31% total solids concentrated milk have been surveyed over a 1-yr period. Very small variations occurred, and no distinctive instability period was observed. The stabilizing effect of pH adjustment with NaH_2PO_4 , Na_2HPO_4 or NaOH.HCl before sterilization was studied. The phosphates produced better stabilization than the acid-base combination at any pH between 6.0 and 7.0. The effectiveness of Na_2HPO_4 showed seasonal variations: the effects were marked on summer milk and smaller in winter milks. Conversely, seasonal variations were observed in the buffer capacity of the concentrates. The results emphasize the possibility of a specific stabilization mechanism by phosphate salts on conc. milks. AS

1448

Kohlmann (KL), Nielsen (SS) and Ladisch (MR). **Effects of a low concentration of added plasmin**

on ultra-high temperature processed milk. *Journal of Dairy Science* 74(4): 1991; 1151-1156

The relationship between proteolysis and gelation was studied in UHT-processed milk following the aseptic addition of the enzyme plasmin at a concn. of 0.15 mg/L. Individual 250-ml containers of commercially processed (direct steam injection, 134.4 C for 14.2 sec) milk were used. The milk was injected with plasmin 1 wk after processing and stored at room temp. (-23 C). Over a 6 month period, the milk was examined for changes in appearance, pH, apparent viscosity, gel formation, enzymatic activity, and casein breakdown. Control milk samples did not gel during the test period. The milk containers that received the plasmin addition began to form a gel at 90 days of storage, and this gelation was accompanied by an increase in apparent viscosity. In the samples with added plasmin, enzyme activity was detected using the chromogenic substrate, H-D-valyl-L-leucyl-L-lysyl-4-nitroanilide (S-2251), and casein breakdown was apparent as examined by SDS-PAGE. It appeared that the added plasmin preferentially attacked β - and α -caseins over k-casein. The evidence supports a relationship between a low level of plasmin activity and the gelation of UHT milk. AS

1449

Manjunath (GM) and Bhat (GS). **Effect of processing on native proteinases in milk.** *Journal of Food Science and Technology (India)* 29(3): 1992; 195-196

The activity of native proteinases in aseptically drawn milk was studied in relation to the processing treatments of milk. The increase in non-protein nitrogen (NPN) content of milk during incubation at 37 C was chosen as a measure of proteinase activity. The breakdown of proteins leading to increase in NPN was estimated by micro-Kjeldhal technique. The milk proteinases appeared to be partly resistant to certain processing treatments like chilling, homogenization and pasteurization. These enzymes can, therefore, cause proteolysis in processed milks. Heat processing above 80 C completely inactivated this enzyme. AS

1450

Sandhu (C) and Singh (RK). **Energy increase in operation and cleaning due to heat-exchanger fouling in milk pasteurization.** *Food Technology* 45(12): 1991; 84-91

This article deals with the mathematical model which estimates the increased energy costs associated with fouling of heat-exchangers and shows that they are of minor concern. CSA

Milk products

Butter

1451

Schroder (BG) and Baer (RJ). **Consumer evaluation of reduced-cholesterol butter.** *Food Technology* 45(10): 1991; 104-107

This article reports a home-use market study undertaken to determine whether acceptable, reduced-cholesterol butter could be produced by replacing milk fat with reduced-cholesterol milk fat. CSA

Cheese

Camemberts cheese

1452

Palich (P), Derengiewicz (W) and Switka (J). **Studies on the shelf-life of modified Camembert cheese.** *Acta Alimentaria* 19(4): 1990; 321-329

The modified Camembert cheese can be stored for 28 days at 4 C and for 6 days at 18 C. BV

Gouda cheese

1453

Rajesh (P), Kanawjia (SK) and Singh (S). **Acceleration of flavour and biochemical changes in buffalo milk Gouda cheese by flavourage.** *Beverage and Food World* 18(4): 1991; 31-33

Addition of flavourage to milk prior to renneting provides full characteristic cheese flavour in a short time. Flavourage 0.0005% level resulted in the most acceptable product. The flavour and body texture development in 1 month old experiment cheese was equal to 3 months old control. BV

Ras cheese

1454

Aly (ME). **Utilization of freeze-shocked lactobacilli for enhancing flavour development of Ras cheese.** *Die Nahrung* 34(4): 1990; 329-335

Freeze-shocked cultures of *Lactobacillus helveticus* or *L. casei* were added at levels of 1% and 2% to Ras cheese milk prior to renneting as an adjunct starter to enhance flavour development of cheese. These additives did not affect the gross chemical composition of the cheeses but increased the formation of soluble nitrogenous compounds, free

volatile fatty acids, the flavour intensity and improved the body characteristic. Also, the counts of bacterial groups (total, proteolytic and lipolytic) of the cheese treated with freeze-shocked lactobacilli were higher than in the control. Moreover, the ripening period was reduced to be 2 months compared with 4 months required for the control cheese. Also, using freeze-shocked culture of *L. helveticus* was the most effective in this respect. AS

Ice cream

1455

Lee (FY) and White (CH). **Effect of ultrafiltration retentates and whey protein concentrates on ice cream quality during storage.** *Journal of Dairy Science* 74(4): 1991: 1170-1180

Ultrafiltration retentates (conc. to three times) and whey protein concentrates were used to replace different levels of SNF in vanilla ice cream at 25, 50 or 75% and 25, 50, 75 or 100%, respectively. All mixes were formulated to make an ice cream containing 12% fat, 9.7% SNF, 12% sucrose, 4% corn syrup solids, and 0.3% stabilizer-emulsifier. Ice cream mixes were evaluated for pH and viscosity after 24 h of aging. These mixes were processed through an HTST pilot plant system and a 4.73-L (5-qt) batch freezer at 80% overrun. The drawing temp. was measured at this time. The ice creams were evaluated for chemical composition, microbiological quality, and sensory properties at 1, 30 and 90 days of storage. Heat shock stability and melt-down properties were tested after 30 days of storage. The results showed that the pH was affected significantly ($P < 0.05$) by substitutions of whey protein conc. and UF retentate. The pH and viscosity increased as the percentage of UF retentate substitution increased, but these two parameters decreased as the percentage of substitution with whey protein concentrate increased. Substitution with the concentrate at 75 and 100% significantly ($P < 0.05$) decreased the viscosity compared with the UF retentate products. The protein and lactose values were affected by replacing different levels of UF retentate in ice cream mixes. Protein values of 3.88 to 4.53% in UF retentate products were higher than those of ice cream with whey protein conc. at 3.18 to 3.55% ($P < 0.05$). Sensory evaluation results showed that ice cream made with substitution of SNF with UF retentate had higher flavour and body and texture scores than that made with whey protein concentrate. Substitution with 25% UF retentate produced the highest mean flavour score of 8.31. AS

Yoghurts

1456

Bayoumi (S). **Nisin and yoghurt manufacture.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991: 65-69

Addition of 25 - 50 RUml⁻¹ of nisin was found to be optimal to produce yoghurt after 5 1/2 hr of incubation with good organoleptic properties and a shelf-life of about 19 days at 10 C and/or 33 days at 6 C. BV

Milk protein

1457

Mistry (VV) and Hassan (HN). **Delactosed, high milk protein powder. 1. Manufacture and composition.** *Journal of Dairy Science* 74(4): 1991: 1163-1169

The objective of this research was to develop a new method for the production of delactosed, high milk protein powder without pH adjustment. Skim milk containing approximately 3.2% protein and 4.91% lactose was ultrafiltered at 38 C to approximately 15% protein and 3.8% lactose. The ultrafiltered milk was batch diafiltered three times at 32 C with water to approx. 18.9% protein and 0.08% lactose and then spray dried. Inlet and outlet air temp. during drying were 120 to 125 C and 75 to 80 C, respectively. The av. composition of the dried product was 5.3% moisture, 83.9% protein, 2.27% fat, 0.73% lactose and 7.05% ash. Sodium dodecyl sulphate-polyacrylamide gel electrophoresis analysis of the powders showed that protein composition was similar to that of skim milk. This powder may have potential in the manufacture of new products or in the improvement of existing products such as low fat yoghurts. AS

MEAT AND POULTRY

Meat

1458

Gordon (A) and Barbut (S). **The microstructure of raw meat batters prepared with monovalent and divalent chloride salts.** *Food Microstructure* 9(4): 1990: 279-295

Comminuting lean meat with chloride salts showed differences in gel strand thickness; KCl and 1.5% NaCl formed multi-component mixed gels but formed more uniform gels when fat was added. Monovalent salts resulted in good distribution of fat globules in coherent matrices. The divalent salts promoted protein aggregation in raw batters. The CaCl₂ batter showed some fat instability, fat channels being not well interconnected. MgCl₂

caused widespread fat channelling and matrix disruption. Some gel formation in meat batters prior to cooking depends on the relative amounts and type of protein in the aqueous phase. $MgCl_2$ may destabilize batters due to extensive pre-cooking protein aggregation while $CaCl_2$ due to increasing protein-protein interaction. SD

1459

Werhoff (P), Bretschneider (W), Guntert (M), Hopp (R), Kopsel (M), Surburg (H). **Identification and formation of novel sulphur compounds in a meat flavour model system.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991: 111-124

The reaction products formed from the aqueous mixture of cysteine, xylose, thiamin and ascorbic acid at 120°C for 5 hr in a lab. autoclave were isolated by simultaneous distillation/solvent extraction according to Likens-Nickerson. The resultant total flavour concentrate was found to possess a characteristic meat-like aroma and was analyzed by capillary GC and combined GC/MS. Identifications were solely focussed on sulphur-containing components which were additionally detected by a selective flame photometric detector. More than thirty volatile sulphur-containing substances have been identified including seven novel heterocyclic flavour components. The unknown flavour constituents were isolated by preparative capillary GC in microgram amounts sufficient for subsequent structure elucidation work by IR and NMR spectroscopic techniques. Spectral data and odour descriptions are given and possible pathways for the formation of these novel sulphur compounds are postulated. AS

1460

Fukal (L). **Modern immunoassays in meat-product analysis.** *Die Nahrung* 35(5): 1991: 431-448

This paper reviews immunochemical methods in meat-product analysis: identification of the origin of raw materials and detn. of protein additives (detection of meat sp. and detn. of minor meat proteins, non-meat proteins in meat products-vegetable protein, milk proteins); immunoassays of microorganisms and bacterial toxins (*Salmonella*, *Staphylococcal enterotoxins*), immunoassays of some contaminants in meat (drug residue, sex hormone residue, pesticides and mycotoxins); diagnosing animal diseases and immunochemical analysis of meat products in practice. 133 references. BV

Pork

1461

Goetsch (SJ), Cunningham (FE) and Chambers (EIV). **Shelf-life of raw and cooked fiber-formulated pork nuggets.** *Journal of Sensory Studies* 5(4): 1990: 241-249

1462

Todd (SL), Cunningham (FE), Schwenke (JR) and Goetsch (SJ). **Sensory analysis of fiber formulated ground pork patties.** *Journal of Sensory Studies* 5(3): 1990: 145-157

1463

Asghar (A), Gray (JI), Booren (AM), Gomaa (EA), Abouzied (MM), Miller (ER), Buckley (DJ). **Effects of supranutritional dietary vitamin E levels on subcellular deposition of α -tocopherol in the muscle and on pork quality.** *Journal of the Science of Food and Agriculture* 57(1): 1991: 31-41

Rabbit

1464

Dzudie (T) and Okubanjo (A). **Effects of two skinning and curing methods on the quality of rabbit meat.** *Journal of Food Science and Technology (India)* 29(3): 1992: 162-166

Thirty two rabbit carcasses were assigned to 4 treatment groups to study the effect of skinning and curing methods on quality and yield of cured rabbit meat. No significant difference was observed in wt. loss between unskinned non-injected and skinned injected cuts after aging except in the leg cut. Loss in wt. was greatest during the first wk of aging and was least during salt equilization and, during the last wk of aging. Both skinning and curing methods significantly affected the proximate composition and chloride content of the aged meat but had no effect on the final pH. Brine injection significantly affected the salt content and tenderness of the rabbit meat. However, differences were not discernible in the other sensory indices. AS

Products

1465

McMindes (MK). **Applications of isolated soy protein in low-fat meat products.** *Food Technology* 45(12): 1991: 61-64

The health benefits of isolated soy protein ingredient, its acceptability by the consumers due to the removal of the carbohydrate and lipid fractions, the strategies for the incorporation of isolated soy protein in meat products, its use in the formulation of low-fat ground beef patties and its application in various new products are described in this article. CSA

Patties

1466

Pati (PK), Anjaneyulu (ASR) and Kondaiah (N). **Effect of buffalo fat premix on the quality of patties.** *Journal of Food Science and Technology (India)* 29(3); 1992: 167-169

There was no significant difference in emulsion stability, cooking yield, shear force value, cooking shrink diam. of patties made with or without fat premixes. Patties containing fat premix made in bowl chopper had significantly ($P < 0.01$) lower mouth coating and higher acceptability compared to those containing fat premix prepared using meat mincer. Patties containing fat premix having equal proportions of meat, fat and whole egg liquid (WEL) had significantly ($P < 0.01$) lower mouth coating and higher acceptability. There was no significant difference between fat premix with or without WEL in reducing mouth coating. AS

Poultry

1467

Gna Song Kee and Babji (AS). **Effect of processing on yield and composition of spent hen surimi (ayami).** *Food Australia* 43(11); 1991: 494-495

The processing of spent hen and deboned broiler meat for production of chicken surimi (ayami) involved grinding followed by three cycles of washing. Grinding removed 66.5% collagen from spent hen meat and 43.8% collagen from broiler meat. Washing resulted in some wt. loss, increase in moisture content and collagen content and decrease in protein, fat and ash contents. SRA

SEAFOODS

1468

Garrett (ESIII) and Hudak-Roos (M). **Developing and HACCP-based inspection system for the seafood industry.** *Food Technology* 45(12); 1991: 53-57

A new and improved inspection system based on the HACCP concept, which would provide reasonable consumer protection in the consumption of seafood products is discussed in this article. CSA

Lobsters

1469

Ramaswamy (HS), Simpson (BK), Ya (T) and Yaylayan (V). **Tray-drying of carotenoproteins recovered from lobster waste.** *Journal of Food Processing Preservation* 15(4); 1991: 273-284

Caroteno-protein slurry dried in air drier at 45, 55 and 65 C 5 and 15% rh showed that the proximate composition of caroteno-protein dried at 45 C, 5 or 15% rh were comparable to that by freeze drying. Higher temp. adversely affected the nutritional composition and/or quality. SD

Fish

1470

Smith (G) and Hole (M). **Browning of salted sun-dried fish.** *Journal of the Science of Food and Agriculture* 55(2); 1991: 291-301

The lipid of traditional salted, sun-dried fish is highly susceptible to oxidation during processing and storage at tropical ambient temp. (25 - 30 C), leading to browning and potential loss of nutritional and economic value of the product. Determinations of extractable fluorescence and soluble brown colour have been found to be relevant indicators of the high degree of lipid oxidation in such fish. Studies on model systems consisting of aerated fish oil and a range of components natural to fish confirmed that, at 25 C, the products of lipid oxidation reacted with phospholipids and amino acids to produce significant fluorescence. Similarly, proteins and amino acids interacted with lipid oxidation products to produce browning, although at 25 C, this only occurred in the presence of water. Temp. above 50 C are required for the development of browning of aerated fish oil alone. The level of free amino acids in salted, sun-dried fish was found to decrease during storage which correlates with amino acid involvement in fluorescence and colour production. The fluorescence/colour can be related mechanically to the development of lipid oxidation products and hence provides a realistic basis for their acting as indicators of extensive lipid oxidation. AS

1471

Akoh (CC) and Hearnberger (JO). **Effect of catfish and salmon diet on platelet phospholipid and blood clotting in healthy men.** *Journal of Nutritional Biochemistry* 2(6); 1991: 329-333

1472

Roberts (B), Morris (BA) and Clifford (MN). **Comparison of radioimmunoassay and spectrophotometric analysis for the quantitation of hypoxanthine in fish muscle.** *Food Chemistry* 42(1); 1991: 1-17

1473

Careche (M), Currall (J) and Mackie (IM). **A study of the effects of different factors on the heat induced gelation of cod (*Gadus morhua*, L.) actomyosin using response surface methodology.** *Food Chemistry* 42(1); 1991: 39-55

The analysis indicated the effects of each of pH, concn. of protein, ionic strength, time and temp. of heating on gel strength (GS) and log gel strength (LGS) and interaction between pairs of factors e.g. lowering pH, increasing concn. of protein increased LGS on which the time of heating had no effect but only on temp. Interaction between concn. and pH; between pH and ionic strength were clear. SD

1474

Van Lith (HA), Zhang (X), Haller (M) and Beynen (AC). **Plasma butyrylcholinesterase activity in rats fed diets containing fish proteins.** *Die Nahrung* 35(5); 1991: 545-546

Catfish

1475

Huang (YW), Eitenmiller (RR), Lillard (DA) and Koehler (PE). **Storage quality of iced channel catfish fed different protein levels.** *Journal of Food Quality* 14(4); 1991: 345-354

The diets contained 24, 28, 32, 36 and 40% of protein levels. Fish fillets overwrapped with polyvinylidene chloride film and stored in ice for 21 days. Lowest protein level showed significantly high fat and no significant effect of fat content on free fatty acid and TBA number in all levels. Panelists could not find quality and off flavour difference between samples. SD

Rainbow trout

1476

Ando (M), Toyohara (H), Shimizu (Y) and Sakaguchi (M). **Post-mortem tenderisation of rainbow trout (*Oncorhynchus mykiss*) muscle caused by gradual disintegration of the extracellular matrix structure.** *Journal of the Science of Food and Agriculture* 55(4); 1991: 589-597

The gradual disintegration of the extracellular matrix structure which may be due to chilled storage was clearly demonstrated by light microscopic observations after compression. It is observed that the extracellular matrix structure might play an important role in maintaining the toughness of fish muscle. BV

Sardines

1477

Beltran (A) and Moral (A). **Changes in fatty acid composition of fresh and frozen sardine (*Sardina pilchardus* W.) during smoking.** *Food Chemistry* 42(1); 1991: 99-109

Free fatty acids separated in fresh and frozen sardine during mixed smoking by TLC, analysed by GC for fatty acids showed that oxidation during smoking resulted in loss of long chain n-3 C₂₀ and C₂₂ fatty acids and the former increased in frozen sardine due to extraction-related effects (weakening of protein-lipid linkage). SD

PROTEIN FOODS

1478

Ashturkar (PB), Vijaya Pande and Snehalatha Reddy. **Development and evaluation of weaning food formulations.** *Journal of Food Science and Technology (India)* 29(3); 1992: 197-198

Four weaning foods (RGB - Rajkeera:green gram:Bengal gram dhal, BRB - bajra:rice flakes:Bengal gram dhal, JSB - Jowar:Soy bean:Bengal gram dhal, JPG - Jowar:puffed Bengal gram:green gram mixes) were formulated and evaluated for sensory parameters. The weaning foods supplied 349 to 362 kcal and 12.6 to 17.2 g of protein per 100 g. Among the four weaning foods RGB had the highest Ca and Fe contents and the max. per cent digestibilities of proteins and carbohydrates. AS

Infant foods

1479

Fligner (KL), Fligner (MA) and Mangino (ME). **Accelerated tests for predicting long-term creaming stability of infant formula emulsion systems.** *Food Hydrocolloids* 5(3); 1991: 269-280

Sterilised, conc. infant formulae models from whey protein concentrate and high-heat non-fat dry milk to yield 40:60% casein to whey ratio. The protein, carrageenan and lecithin levels were varied. Emulsion stability was assessed by gravitational and centrifugal creaming, relative viscosity, adsorbed protein and light scattering. Evaluating the relationship of compositional factors to physical stability. It was found that centrifugation and relative viscosity were the best predictors of 10 and 18 wk stability. SD

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

1480

El-Salam (MHA), Mahran (GA), Haggag (HF), Mahfouz (MB) and Zaglol (A). **Manufacture and properties of beverages based on fermented permeate and natural fruit juices.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991; 95-101

Reconstituted skim milk (10% total solids) was ultrafiltered. The obtained permeate was inoculated with a mixed culture of *Lactobacillus delbrueckii* ssp. *bulgaricus* and *Streptococcus thermophilus* (1:1) and incubated at 42 C for 24 hr. The fermented permeate was mixed with one of the following flavouring substances: orange juice, strawberry or apricot homogenates at the rate of 4:1. Suitable food grade colour, sugar and stabilizer were added and the prepared beverages were homogenized at 150 kg cm⁻². The prepared beverages had acceptable properties and good keeping quality for 15 days at room temp. and in the refrigerator. AS

Non-alcoholic beverages

Brandy

1481

Schwarz (E) and Hammes (WP). **The application of inulase producing yeasts for production of brandy from Jerusalem artichokes.** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(3/4): 1991; 70-75 (De)

The fermentation of Jerusalem artichoke mashes for producing brandies was investigated at lab. scale as well as under practical conditions. The inoculation with inulase producing yeasts of *Kluyveromyces* sp., the pH of the mashes was reduced from 4.7 - < 3.5 which lead to reduced bacterial growth connected with a 24% increase in alcohol yield. BV

Coffee

1482

Trugo (LC), De Maria (CAB) and Werneck (CC). **Simultaneous determination of total chlorogenic acid and caffeine in coffee by high performance gel filtration chromatography.** *Food Chemistry* 42(1): 1991; 81-87

High performance gel chromatography method with TSK 3000-SW column developed showed good linearities and recoveries for chlorogenic acid and

caffeine determined simultaneously. They showed highly significant positive correlation 0.997 for caffeine also estimated by reverse phase chromatography and 0.998 for chlorogenic acid also estimated by AOAC and adapted reversed phase chromatographic methods with 6.5% and 5.0% coeff. of variations respectively. Green, roasted decaffeinated and instant coffees can be routinely analysed by this method. SD

1483

Maier (HG). **About the contents of carcinogenic substances in coffee.** *Deutsche Lebensmittel-Rundschau* 87(3): 1991; 69-75 (De)

A review is given of the publications of the last 25 yrs about the detn. of polycyclic aromatic hydrocarbons (PAH), nitrosamines and carcinogenic mycotoxins (including ochratoxin) in coffee. It follows that nitrosamines don't occur, mycotoxins seldom in green coffee, probably not in roasted coffee. In most cases, benzo[a]pyrene (BP) has been determined as a leading substance for all PAH. The other PAH occur normally in certain proportions to BP. The little amounts of BP are no problem for the consumer, because they make up only 0.03 to 0.6% of the total amount consumed with food. After normal roast the contents are often reduced in respect to green coffee. Differences between roasting by direct firing and by indirect air heating could not be detected. If the heat transfers to the beans by contact with hot surfaces, more BP is formed than by transfer from hot gases. The transfer of BP to the coffee brew depends on the concn. of benzo[a]pyrene in the roasted coffee and on the water-to-coffee ratio. It amounts to approx. 5% in the mean. Corresponding to that, the contents in coffee extracts are very low. 32 references. AS

Fruit juices

1484

Chandler (BV). **Fruit juice review. 7.** *Food Australia* 43(4): 1991; 143-145

This review covers raw materials, juice processing-general, juice processing-citrus fruits, juice processing-other fruits, packaging and storage, chemical analysis and components, adulteration control, industry matters and legislation. SRA

Orange juices

1485

Arreola (AG), Balaban (MO), Wei (CI), Peplow (A) and Marshall (M). **Effect of supercritical carbon**

dioxide on microbial populations in single strength orange juice. *Journal of Food Quality* 14(4); 1991; 275-284

Orange juice treated at 35, 45 and 60 C; 8.3, 20.7 and 33.1 MPa showed some reduction of total plate count at low temp. The combination of high pressure, depressurization shear and lower pH due to temporary formation of carbonic acid could have inhibited the normal flora of juice. Kinetic parameters, D values for microbial reduction at the same temp. were generally lower and Z values decreased at high pressures. SD

1486

Ulgen (N) and Ozilgen (M). **Kinetic compensation relations for ascorbic acid degradation and pectinesterase inactivation during orange juice pasteurizations.** *Journal of the Science of Food and Agriculture* 57(1); 1991; 93-100

The thermal degradation kinetics of ascorbic acid and the inactivation kinetics of pectinesterase were studied experimentally with pH-adjusted orange juice. No simple trends were observed in variation of the kinetic parameters with pH, but both kinetic functions agreed with kinetic compensation relations. An isokinetic temp. was observed for ascorbic acid degradation at pH 2.5, 3.0 and 3.5 implying that the same degradation mechanism was valid at these pH values. A large deviation at pH 4.0 from this isokinetic reaction rate implied that the degradation mechanism was different at this pH. There was no isokinetic temp. for pectinesterase inactivation reactions, indicating that pectinesterase was inactivated by different mechanisms at different pH values. The variation of the inactivation mechanism of pectinesterase with pH was attributed to its more complex molecular structure. AS

Tea

1487

Finger (A) and Engelhardt (UH). **Flavonol glycosides in tea - kaempferol and quercetin rhamnoglucosides.** *Journal of the Science of Food and Agriculture* 55(2); 1991; 313-321

Quercetin and kaempferol rhamnoglucosides are characteristic compounds of *Camellia sinensis*. Their structures were determined as quercetin- and kaempferol-3-O- [β -D- glucopyranosyl-(1-3)- α -L-rhamnopyranosyl-(1-6)- β -D-glucopyranosides]. Reversed phase HPLC methods for preparative isolation and analytical separation of both compounds were developed. The structural elucidation of the compounds by means of NMR spectroscopy, fast atom bombardment MS and

GC-MS of the sugar moieties is described. Black tea contains 0-0.95 g kg⁻¹ quercetin rhamnoglucoside and 0.05-1.25 g kg⁻¹ kaempferol rhamnoglucoside. AS

Wines

1488

Arvanitoyannis (I), Fronimos (P) and Psomiadou (E). **Influence of the concentration of the main organic acids of wine on the cations adsorption of bentonites in synthetic wine.** *Die Nahrung* 35(5); 1991; 475-483

The influence of concn. of the main organic acids (tartaric, malic, citric and succinic acids) on the cation content (Ca, Mg, Fe, Cu, Zn and Mn) during treatment with optimum mass of two bentonites (Ca and Ca-Na) in synthetic wine, is studied. Only in case of succinic acid, a lower Fe absorption was observed, probably due to its weaker acid character, compared to other acids. BV

FATS AND OILS

1489

Loose (S), Meusel (D), Muschter (A) and Ruthe (B). **Water binding of adsorptive immobilized lipases.** *Die Nahrung* 34(1); 1990; 37-46 (De)

It is supposed that not only the total water content of lipase preparations but more their state of water binding is of technological importance in enzymatic interesterification reactions in systems nearly free from water. The isotherms at 65 C of two microbial lipases immobilized on various adsorbents as well as different adsorbents themselves are shown. The water binding capacity in the range of water content of technological interest decreases from the anion exchange resin Amberlyst A 21 via nonpolar adsorbent Amberlite XAD-2 to Kieselgur Celite 545. It is demonstrated that water binding by lipases is depending on temp. but is also affected by adsorptive immobilization. Adsorptive immobilized lipases show hysteresis, which is very important for preparing a definite water content of the enzyme preparations. AS

1490

Ott (K) and Meusel (D). **A method for the quantitative determination of ω -3-polyunsaturated fatty acids by reductive ozonolysis.** *Die Nahrung* 34(1); 1990; 93-94

1491

Glicksman (M). **Hydrocolloids and the search for the "oily grill".** *Food Technology* 45(10): 1991: 94, 96-101, 103

This article deals with the production of high-quality low-fat and no-fat food products by the conjunction of hydrocolloids with other food components. Various fat-replacer ingredients having fat-mimetic properties are synthetic fat substitutes, emulsifiers, hydrocolloids, starch-derivatives, hemicelluloses, β -glucans, soluble bulking agents, microparticulates, composite materials and functional blends and the application of these in salad dressings, frozen desserts and bakery products are discussed. CSA

1492

Khatoon (S). **Biotechnological approach for the modification of oils and fats.** *Indian Food Industry* 10(5): 1991: 38-41

The biotechnological approach of fats and oils modification by genetic manipulation and its advantages: chemical and biochemical interesterification, its advantages and applications and the recent trends in interesterification are discussed in this article. CSA

Fats

1493

Morsel (J-Th). **Lipid peroxidation. Part I. Primary reactions.** *Die Nahrung* 34(1): 1990: 3-12 (De)

Edible fats and oils are an important component of human nutrition. There are many kinds of changes and destruction of lipids. One of the most important processes is the autoxidation of essential fatty acids. Primary products of oxidation are monohydroperoxides of fatty acids formed by three different pathways. Thermal activation of fatty acids will be followed by thermodynamically controlled distribution of the hydroperoxidisomers. With enzymatic or photochemical oxidation specific distribution of isomeric hydroperoxides is observed. These products can be also used for the determination of the type of oxidation which took place. The hydroperoxides formed in the process of oxidation cause a radical chain reaction with a powerful progress of oxidation. The products formed by chain termination are characterized by different stability. These products include the possibility of decomposition and consequent reactions. AS

1494

Morsel (JTh) and Meusel (D). **Lipid peroxidation. Part 2. Secondary reactions.** *Die Nahrung* 34(1): 1990: 13-27 (De)

Lipids and lipid containing foods are altered by autoxidative processes resulting in the formation of hydroperoxides which are considered as the actual primary autoxidation products. These hydroperoxides cause a var. of secondary reactions giving di- and trihydroperoxides, hydroperoxyepidioxides, endoperoxides and hydroperoxyepoxides, so called secondary autoxidation products at a primary level. Sometimes they are only minor substances. The formation of primary autoxidation products is accelerated by reaction conditions as increased temp., oxygen, metal ions and sensibilisators but is inhibited by natural and synthetical antioxidants. The decomposition of hydroperoxides and secondary autoxidation products at the primary level results in volatile substances decreasing the flavour quality of lipid containing foods. Simultaneously there are other cleavage and decomposition products remaining in the lipid causing a reduction of its oxidative stability. AS

1495

Lewerenz (H-J), Bleyl (DWR), Ozierenski (B), Plass (R) and Macholz (R). **Toxicological effects of a fatty acid mixture in rats.** *Die Nahrung* 35(5): 1991: 465-474

The effects of a fatty acids mixture containing nearly 50% odd numbered fatty acids (PC-Saure) were studied in a subchronic toxicity test in male and female rats. The animals received PC-Saure in their diet at levels of 0, 1.25, 2.5 and 5% for 13 wks. Food intake was increased at 5% PC-Saure level in males. Food efficiency was initially decreased in males and females of this group. Ingestion of PC-Saure resulted in increases of the urine volume and the urinary lactate dehydrogenase activity in both sexes. Male and female rats fed PC-Saure showed elevated serum activities of alkaline phosphatase and leucine aminopeptidase and decreases in serum cholesterol and triglycerides. Dietary PC-Saure elevated the serum creatinine content in males at the two highest levels. A transitory increase in the activity of the serum alanine aminotransferase was observed in females fed 5% PC-Saure. Increased liver and kidney wt. were found in both sexes. AS

1496

Sen (DP). **Omega-3 fatty acids in health and disease.** *Indian Food Industry* 10(5): 1991: 33-37, 32

The importance of omega-3 fatty acids (FA) in human physiology, the effective use of omega-3 and

omega-6 FA in coronary heart disease, the studies conducted as an experimental evidence on the beneficial effects of omega-3 FA, the human requirements of omega-3 FA, sources of omega-3 FA (linseed oil, continental and aquatic food chain, micro-algae, oil-sardine fish) and its occurrence in Indian situation are covered in this article. CSA

Oils

1497

Blenford (D). **Speciality oils**. *Food* (5): 1991; 8-9

The author examines the rising popularity for speciality oils (hazelnut, pecan, almond, sesame (roasted, unroasted, black), grapeseed, olive and walnut). Aspects covered include fatty acid constituents, flavour characteristics and saturation values and application of speciality oils and standard oils. BV

1498

Marquard (R). **Investigations on the influence of genotype and location on the tocopherol content of the oils from different oil-crops**. *FAT Science Technology* 92(11): 1990; 452-455 (De)

Eight plant sp. have been cultivated on climatically differentiated locations as well as in phytotron trials, in order to determine the influence of genotype and environmental conditions on the tocopherol content of the oil. The tocopherol content has been related with the oil content of the seeds and the part of the main polyenic fatty acid of the plant. Considering the genetic range of variation and the inheritance an increase of tocopherol content through breeding efforts seems likely. Especially oil plants which seeds can directly be consumed or which oil needs not to be refined, seem to be promising. Concerning the environmental influence, biosynthesis of tocopherol was promoted by increased temp. The negative correlation to the oil content of the seed could be due to the fact that oil plants of our climatic conditions yield higher oil contents with low temp. AS

1499

Achaya (KT). **Overcoming constraints in edible oil usage**. *Indian Food Industry* 19(5): 1991; 22-26

Coconut oils

1500

Boutin (D). **Small-scale coconut oil mills. Use of fresh kernels**. *Oleagineux* 45(7): 1990; 330-331

This article describes the processing method of coconut for small scale extraction of coconut oil. Aspects covered are description of the processing method (shelling the fresh kernel, grinding the kernel, cooking, oil extraction, filtering and extraction rate), precautions during oil preparation, and investment required to setup a small-scale mill. BV

Palm oils

1501

Sidek (BB). **Palm oil extraction by double pressing**. *Oleagineux* 45(12): 1990; 559-565 (Fr)

The process consists in pressing the fruits once at low pressure, separating nut fibres from the press cake and pressing the fibres alone a second time at high pressure, hence avoiding the risk of breaking the nuts. The process reduces oil losses in fibre, reflected in a 0.2 p. 100 increase in the oil extraction rate and an increase of around 1 p. 100 in the kernel extraction rate. In addition, screw and press-cage wear is reduced, as is oil contamination by lauric oil. Lastly, with a few adjustments, it is possible to obtain palm oil with a high IV and carotene content for vitamin A extraction. AS

1502

Driss (F). **Nutritional role of dietary fats special reference to palm oil**. *Oleagineux* 45(8/9): 1990; 384-385

General properties of lipids (saturated fatty acids, monounsaturated fatty acids and polysaturated fatty acids), palm oil and blood lipids, palm oil and eicosanoids, palm oil and cancer, dietary lipids and peroxidation are discussed briefly. BV

1503

Berger (KG). **Recent developments in palm oil**. *Oleagineux* 45(10): 1990; 437-447

Aspects covered are: use of palm oil in foods (ice cream, processed cheese, hamburgers, meat croquettes, chicken nuggets, chocolate milk, chocolate custard and vanilla custard), crystallization process of palm oil, quality changes in palm oil during transport, pilot plants for the preparation of diesel fuel from palm oil, and the recovery of vitamin E compounds from palm fatty acid distillate. BV

1504

Jayalekshmy (A) and Mathew (AG). **Effect of roasting on the lipids, sugars and amino acids of oil palm kernel**. *Oleagineux* 46(4): 1991; 163-168

Palm kernel oil finds only limited use as a vegetable oil in India, mostly due to its bland flavour. Roasting of palm kernels improves the flavour of palm kernel oil, more or less comparable with coconut oil. Flavour compounds of roasted palm kernel include pyrazines, furans etc. which are formed during Maillard reaction between sugars and amino acids. The chemical changes occurring in the non-volatile constituents like lipids, sugars and amino acids of palm kernel on heating are not hitherto investigated and are reported for the first time. It is seen that lipids are not very much affected during heating. On the other hand, the sugars (L- rhamnose, mannose) and fructose and free amino acids (valine, isoleucine and leucine) are found to be more affected. AS

Rapeseed oils

1505

Kroll (J), Kujawa (M) and Schnaak (W). **Preparation of rapeseed proteins by extraction. Ultrafiltration and diafiltration.** *FAT Science Technology* 93(2); 1991; 61-65

From industrial rapeseed meal (*Brassica napus*, Var. Sollux) different protein preparates are prepared by varying extractions (water extraction, extraction with 1% CuSO₄ solution, extraction with 5% sodium chloride solution) following ultrafiltration (UF), diafiltration (DF) and drying. The UF, UF/DF respectively is a comparatively simple process for concn. and purification of all solved proteins without losses (globulins and above all albumins). The UF/DF treatment of a 5% sodium chloride solution protein extract leads to a preparate containing more than 90% protein in which glucosinolates and splitting products and also phytate are not detectable. AS

1506

Malecka (M). **The effect of squalene on the heat stability of rapeseed oil and model lipids.** *Die Nahrung* 35(5); 1991; 541-542

Results indicate that addition of squalene in the amount of 0.4% improved the stability of rapeseed oil and model lipids during heating at 170 C. BV

SPICES AND CONDIMENTS

Spices

1507

Kawakishi (S). **Antiplatelet factors in spices.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(5); 1991; 445-453 (Ja)

Turmeric

1508

Pawar (VS), Dev (DK), Pawar (VD), Rodge (AB), Surve (VD), More (DR). **Moisture adsorption isotherms of ground turmeric at different temperatures.** *Journal of Food Science and Technology (India)* 29(3); 1992; 170-173

Moisture adsorption characteristics of turmeric powder were evaluated at 15, 25, 35 and 45 C. The adsorption isotherms were sigmoid and represented the Type II isotherms according to the BET classification scheme. An upward temp. shift from 15 to 45 C led to a shift of isotherm towards the right side indicating that any constant moisture content, *a_w* increased with increasing temp. Of the 6 mathematical equations, BET equation was unsatisfactory as it gave very high relative mean square root of error (RMS %) values. Oswin, Smith, Halsey, Henderson and Chung-Pfost equations described well the data at low temp. but became less satisfactory at higher temp. as evidenced by the RMS (% values). Free energy change of adsorption decreased exponentially at all temp. as the moisture content of the sample increased. Binding energy of sorption calculated at three mean temp. (20, 30, 40 C) also decreased with increasing moisture content. The calculated values of isosteric heats of adsorption ranged from about 11 kcal/mole to 19 kcal/mole. AS

SENSORY EVALUATION

1509

Chai (E), Oakenfull (DG), McBride (RL) and Lane (AG). **Sensory perception and rheology of flavoured gels.** *Food Australia* 43(3); 1991; 256-261

Orange flavoured gels prepared from alginate, K-carrageenan or agar showed decreased smoothness, flavour and sweetness with gel strength; firmness increased with gel strength. The perceived firmness of alginate gels was > that of K-carrageenan gels having the same rupture strength or shear modulus; but smoothness, sweetness and flavour were greater in the K-carrageenan gels. SRA

1510

Lawless (HT) and Glatter (S). **Consistency of multidimensional scaling models derived from odour sorting.** *Journal of Sensory Studies* 5(4); 1990; 217-230

Six groups of subjects with varying degree of experience and training in odour evaluation were found highly similar as indicated by interpoint distance correlations (medium $r = 0.74$) obtained in multidimensional perceptual model analysis and also confirmed by retest correlation of a group tested twice. The odour sorting task was unaffected by learning other cognitive/linguistic influences and showed fair degree of reliability and inter-group consistency in odour quality perception. SD

1511

Griffin (R) and Stauffer (L). **Product optimization in central location testing and subsequent validation and calibration in home-use testing.** *Journal of Sensory Studies* 5(4); 1990; 231-240

Six different products made from varying the proportion of the 3 ingredients of a dry powdered soft drink were evaluated by a consumer panel on a 15 point liking scale. The data modelled in a consumer liking surface was used to optimize the product in a central-local test (CLT). Four of the differentially accepted products, evaluated by a paired-preference home-use test (HUT) confirmed the results indicating that CLT can be adopted to guide the product development process. SD

1512

Galvez (FCF) and Resurrection (AVA). **Comparison of three descriptive analysis scaling methods for the sensory evaluation of noodles.** *Journal of Sensory Studies* 5(4); 1990; 251-263

Data collected on two samples of mungbean starch noodles by unstructured line scale (ULS), semi-structured line scale (SLS) and category scales (CS) indicated that ULS being most reliable and sensitive the panelists discriminated better the samples. Also increased anchoring of line scales did not increase the sensitivity or the reliability of the scale. SD

1513

Lundahl (DS) and McDaniel (MR). **Use of contrasts for the evaluation of panel inconsistency.** *Journal of Sensory Studies* 5(4); 1990; 265-277

A statistical criteria, treatment interaction variation is used to identify panelist outliers and data analysis modified to remove the outlier influence for treatment differences. SD

1514

Thieme (U) and O'Mahony (M). **Modifications to sensory difference test protocols: The warmed up paired comparison, the single standard duo-trio and the A-not A test modified for**

response bias. *Journal of Sensory Studies* 5(3); 1990; 159-176

Difference tests modified according to psychological theory, e.g. paired comparison with 'warm-up', A-not A by addition of sureness judgements and duo-trio by using the weaker stimulus as the standard, showed improved sensitivity. Warmed up paired comparison test, overcoming the lack of definition of the dimension of difference between treatments, was found more sensitive than the duo-trio test. SD

1515

Blank (DM) and Mattes (RD). **Exploration of the sensory characteristics of craved and aversive foods.** *Journal of Sensory Studies* 5(3); 1990; 193-202

The data provided by 70 panelists confirmed that sensory characteristics induce cravings and aversions for different foods: cravings, being intermittent were found for sweet tasting and pleasant smelling items while aversions, being chronic for bitter or bad tasting and unpleasant smelling items. Chemesthetic attributes like texture and thermal sensations create cravings whereas texture and irritating sensations aversions. SD

1516

Fishken (D). **Sensory quality and the consumer: View points and directions.** *Journal of Sensory Studies* 5(3); 1990; 203-209

Quality is subjected to change owing to constant competition and improvement. Therefore its definition also changes according to the marketing objective till the attainment of superior quality. The flavour profiles of raw materials (tomato ketchup) could be controlled and the blending of flavours, brix-acid ratio, colour and quality of pulp be engineered to obtain superior quality product. Addition of fruit seeds may even enhance the naturalness of the product. SD

1517

Vincent (JFV), Jeronimidis (G), Khan (AA) and Luyten (H). **The wedge fracture test. A new method for measurement of food texture.** *Journal of Texture Studies* 22(1); 1991; 45-57

The instrumental tests on Cox apple and cheese were performed on an Instron using wedges made from stiff-backed razor blades glued with epoxy to a wood spacer. A sensory panel of 13 members recorded the distance their teeth had penetrated into the samples of 15 mm apple cubes and 20 mm cheese cubes. Correlating these data, it was shown

that the wedge penetration technique can usefully be adopted to foods to determine fracture parameters of brittle, semibrittle foods, fruits and vegetables. SD

FOOD STORAGE

1518

Thorpe (GR), Tapia (AOJ) and Whitaker (S). **The diffusion of moisture in food grains - I. The development of a mass transport equation.** *Journal of Stored Products Research* 27(1): 1991: 1-9

In previous studies of diffusion of moisture content in stored grains the mass transfer driving force has been assumed to be either the gradient of the grain moisture content, or that of the water vapour pressure in the interstices of the grain. Effective diffusivities have been estimated empirically. In the present work a more fundamental approach is adopted in the analysis and the laws of continuum mechanics are taken to be axiomatic. This enables to write the differential equations that govern mass continuity in the grain and interstitial air, and conditions at the grain/air interfaces complete the formulation of the boundary value problem. The next step of the analysis involves expressing the mass continuity equations in terms of spatially averaged moisture concn. This is achieved by invoking the spatial averaging theorem. A particularly novel aspect of the development is the establishment of constraints that must be satisfied if local mass equilibrium between each phase is to be assumed when the sorption isotherms are non-linear and temp. dependent. Finally, the mass transfer equation expressed in terms of volume averaged quantities and local deviations, from these quantities, is derived. BV

1519

Thorpe (GR), Tapia (JAO) and Whitaker (S). **The diffusion of moisture in food grains - II. Estimation of the effective diffusivity.** *Journal of Stored Products Research* 27(1): 1991: 11-30

In this paper the boundary value problems that govern the spatial deviations is formulated and solved and subsequently the effective diffusivity of moisture in stored grains is estimated. Particular care is taken to establish the length scale constraints that must be satisfied for the boundary value problems to be a true reflection of reality. In keeping with this approach, the constraints that must be satisfied to treat a bulk of grain as if it a spatially periodic porous medium is established. A closed form expression for the effective diffusivity of moisture in a bulk of grain is obtained by exploiting the properties of the Chang unit cell. Results from

the analysis are compared with published experimental data and it is found that agreement between the two is excellent. BV

INFESTATION CONTROL AND PESTICIDES

1520

Banks (HJ). **Influence of water and temperature on release of phosphine from aluminium phosphide-containing formulations.** *Journal of Stored Products Research* 27(1): 1991: 41-56

The rate of release of phosphine from commercial aluminium phosphide formulations was studied under controlled conditions in nitrogen with and without wheat in the exposure chamber. The shape of the cumulative release curve with time was unaffected by gas flow rate over the formulation or by temp., humidity or manufacturer. It was well described by a power function relating quantity released to time, changing to an exponential phase after 70% of decomposition. Although an exponent of 1.15 in the initial phase described curves both in the presence of and without wheat satisfactorily, an exponent of 1.00 gave a better fit to data from formulations in wheat. Time to 50% decomposition was dependent on absolute water content of the gas passing over the formulation and independent of temp. The rate of release under fixed conditions in the absence of wheat was linearly correlated with that in wheat. The rate of release in humidified nitrogen without wheat varied exponentially with gas flow rate reaching a limiting value at high flows. Release in wheat was little affected by gas flow. In 12.2% moisture content wheat at 30 C the release rate was 0.6 - 0.8 times the max. value attained under the same humidity and temp. but without wheat. At low gas flows most of the moisture required for reaction was abstracted from the grain, not obtained from the humidified gas. Under conditions where water availability was not rate limiting the rate of release of the most reactive formulation was about twice that of the least. The test systems described provide a means of rapid comparative assessment of release characteristics of formulations. A method of reconstructing cumulative release curves is given. AS

1521

Longstaff (BC). **An experimental study of the fitness of susceptible and resistant strains of *Sitophilus oryzae* (L.) (Coleoptera: curculionidae) exposed to insecticide.** *Journal of Stored Products Research* 27(1): 1991: 75-82

Three resistant strains of *Sitophilus oryzae* were assessed at 30 C and 55% RH for their effect to sublethal doses of deltamethrin and

pirimiphos-methyl. All 3 resistant strains showed higher fecundity levels than the susceptible strain in the control treatments. The susceptible strain showed the most pronounced effects to exposure to insecticide, with a doubling of fecundity in the 1st wk of exposure to the lowest dose of pirimiphos-methyl, followed by progressive reductions to zero. No progeny were produced at the higher doses. Deltamethrin invariably reduced fecundity in this strain. Exposure to the highest dose of deltamethrin, resulted in a 10% reduction in the geometric mean developmental period in the susceptible strain, due to a skewing of the emergence curve. The other strains showed substantially smaller changes. The overall effect of these responses upon population growth rate is investigated and it is apparent that increasing the dose of an insecticide may not always reduce the population growth rate, even though mortality is increased. BV

1522

Bell (CH) and Savvidou (N). **Tolerance of the diapausing stages of *Plodia interpunctella* and *Ephestia cautella* (Lepidoptera: pyralidae) to methyl bromide and its correlation with diapause intensity.** *Journal of Stored Products Research* 27(2); 1991: 109-114

The duration of diapause at 20 C in 8 stocks of *Plodia interpunctella* and 2 stocks of *Ephestia cautella* was compared with the tolerance of diapausing larvae to methyl bromide, the fumigant used for the control of infestations of these moths in the food industry. The tolerance of the *P. interpunctella* stocks ranged from quite low to very high, the most tolerant individuals requiring a concn. time (ct) product of 280 mg h/l. for complete kill. Some changes were evident in the individual tolerances of 6 stocks of this sp. over a 6 yr period, probably as a result of a set lab. rearing procedure. The 2 stocks of *E. cautella* both showed a moderate degree of tolerance, all larvae dying at ct products of 150 mg h/l. or above at 15 C. Taking all results together, a significant direct correlation was established between either mean or max. duration of diapause in these moths, the higher was the tolerance shown to methyl bromide. An increase in the mean duration of diapause from < 50 to > 80 days was accompanied by an increase in the LD₉₉ from < 130 to > 210 mg h/l. AS

1523

Schmidt (GH), Risha (EM) and El-Nahal (AKM). **Reduction of progeny of some stored-product Coleoptera by vapours of *Acorus calamus* oil.** *Journal of Stored Products Research* 27(2); 1991: 121-127

The number of offspring emerging from the adult diets used during and after treatment with *Acorus calamus* oil vapours against the adults of *Sitophilus granarius* (L.), *S. oryzae* (L.) and *Callosobruchus chinensis* (L.) was considerably lower than in the respective controls. The results indicate that a 96 h exposure to *A. calamus* oil vapour was satisfactory for controlling the adults and their deposited eggs. On the other hand, in *Tribolium confusum* there was no effect. BV

1524

Kraus (S) and Gerrard (D). **Pest control with pressurized CO₂ - an alternative to common treatment with poisonous gases.** *Getreide-Mehl und Brot* 44(8); 1990: 246-248 (De)

BIOCHEMISTRY AND NUTRITION

1525

Kanwar (JR), Sharma (PB) and Kanwar (SS). **Biochemical and nutritional characteristics of non-conventional protein sources.** *Journal of the Science of Food and Agriculture* 55(1); 1991: 141-151

Some nutritional and antinutritional characteristics of *Cucumis sativus* L and *Lagenaria vulgaris* (Molina) Standl seeds were studied. The mature seed kernels contained 312-318 gkg⁻¹ crude protein, 9 - 10 gkg⁻¹ crude fibre, 444 - 463 gkg⁻¹ crude fat, 43 - 45 gkg⁻¹ ash and 114 - 142 gkg⁻¹ carbohydrates. The biological values of cucumber and bottle gourd proteins were 74.35 and 74.20 respectively. The essential amino acid profile compared well with the FAO/WHO scoring pattern except for a deficiency of lysine and isoleucine. Lysine was the first limiting amino acid in both the proteins. The leucine:isoleucine and leucine:lysine ratios did not show imbalance. Trypsin inhibitor, phytate, lectin and tannin levels were determined in the defatted decorticated cucurbit seed meals. Heat treatment reduced the trypsin inhibitor and lectin activities in all samples to negligible levels. Levels of phytate and tannins were found to be similar in all samples. AS

1526

Siti-Mizura (S), Tee (ES) and Ooi (HE). **Determination of boric acid in foods: Comparative study of three methods.** *Journal of the Science of Food and Agriculture* 55(2); 1991: 261-268

Three models for the detn. of boric acid in foods were studied in detail, namely the titrimetric method using mannitol, and two colorimetric procedures using carminic acid or curcumin. Agar-agar strips, pickled mango, noodles and prawns were analysed

and the repeatability, sensitivity and recovery of the methods compared. The titrimetric curcumin methods gave mean values for boric acid which were significantly ($P < 0.05$) higher than those of the carminic acid method. Results with the titrimetric method did not differ from those with the curcumin method: the latter method gave good recoveries (-100%) for all 4 foods at all levels of addition. Analyses carried out on NBS Standard Material showed that the curcumin method gave the most accurate results. This method was also found to show the least internal variation both in terms of mean boric acid content and recovery. Furthermore, the method possessed practical advantages over the other two techniques. Based on the results obtained from the comparative studies, the curcumin method was found to be the most reliable and hence would be the method of choice for boric acid detn. in foods. AS

1527

Tolstoguzov (VB). **Functional properties of food proteins and role of protein-polysaccharide interaction.** *Food Hydrocolloids* 4(6): 1991: 429-468

This review discusses the functional properties of food proteins in multicomponent systems and the following trends of research: (i) complexing of proteins and polysaccharides including oligomeric proteins; (ii) nature of biopolymer incompatibility in solution; (iii) effect of thermodynamic incompatibility and complexing of proteins and polysaccharides on the functional properties of food proteins, including solubility and behaviour of proteins at the water-oil interface during emulsion stabilisation and on protein gelation; (iv) incompatibility of proteins and polysaccharides in their water-plasticized melt mixtures and the effect of this phenomenon on the formation of structure and properties of proteins textured by thermoplastic extrusion. SD

1528

Kowswig (S) and Morsel (JTh). **Comparative studies on quantitative determination of tocopherols.** *Die Nahrung* 34(1): 1990: 89-91 (De)

1529

Sacks (FM). **The role of cereals, fats, and fibers in preventing coronary heart disease.** *Cereal Foods World* 36(9): 1991: 822-826

1530

Torre (M) and Rodriguez (AR). **Effects of dietary fiber and phytic acid on mineral availability.** *CRC Critical Reviews In Food Science and Nutrition* 30(1): 1991: 1-22

This review covers fiber as the determinant of mineral availability: natural fiber sources (cereals, legumes and fruits), isolated fiber fractions (acid detergent fiber and neutral detergent fiber), individual fiber components (cellulose and hemicellulose, pectin, lignin and gums); the effect of phytic acid on mineral availability (chemistry and occurrence of phytic acid, interactions of Fe, Cu, Ca, Zn, Mg with phytic acid) and future developments. 134 references. SRA

1531

Kaushalya Gupta, Barat (GK), Wagle (DS) and Dhindsa (KS). **Effect of conventional and non-conventional green leafy vegetables on haematological indices and blood constituents of rats.** *Journal of Food Science and Technology (India)* 29(3): 1992: 182-184

Haematological studies revealed significant reduction in haemoglobin red blood corpuscles (RBC) and white blood corpuscles (WBC) in rats fed with different dry vegetables as sole protein source (T_1). Significant reduction in RBC was also observed when diet was supplemented (5g fresh/day) with fresh colocasia, drumstick, fenugreek and pumpkin (T_3) leaves. Differences in haemoglobin, RBC and WBC between male and female rats were significant. Relative neutrophilia and lymphocytopenia were observed in drumstick fed group (T_1). On the other hand, there were relative neutropenia and lymphocytosis in rats fed with dry drumstick vegetable contributing 2% protein in the diet (T_2). A significant increase in plasma protein in amaranth fed group and decrease in blood glucose in amaranth, colocasia and drumstick (T_3) fed groups was observed. AS

1532

Nayak (RR), Samant (SK) and Singhal (RS). **Vitamins as additives in processed foods.** *Beverage and Food World* 18(4): 1991: 22-25

This article discusses the various facets of vitamins as additives in processed food. Vitamins as antioxidants and colourants is discussed briefly. Use in shortening, lard, margarines and other fat based products, eggs, dairy products and analogues, flour based products, confectionery products, gelatin desserts and puddings, popcorn, fish sticks and potato chips, prevention of thermal oxidation of fats and edible oils, wines, meat, dairy products, fruit processing, carbonated beverages, fish products and as flour or bread improver is also covered in this article. BV

Nil

FOOD LAWS AND REGULATIONS

1533
Lewerenz (H-J), Mieth (G), Bleyl (DWR), Plass (R) and Schliemann. Toxicological evaluation of sucrose carboxylic acid esters in subchronic feeding studies in rats. Part I. Effect of sucrose fatty acid polyesters. *Die Nahrung* 35(5): 1991; 513-524 (De)

1534

Scherer (CW). Strategies for communicating risks to the public. *Food Technology* 45(10): 1991; 110, 112-116

Discusses the assumptions and issues associated with the conventional risk communication paradigm, explores the principles and consequent strategies of interactive risks communication as an emerging and more viable paradigm and some of the implications of this new paradigm for communicating about food risks, safety and quality. CSA

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GENERAL

1535

Sharma (SK). **Status of processed food exports.** *ISI Bulletin* 5(9): 1991: 321-323

Article covers status of Indian food industry, the export figures of fruits and vegetables, meat and other processed foods, the list of countries importing Indian foods and the possibilities of exploring the EEC for exporting processed foods. SRA

FOOD PROCESSING

1536

Macku (C) and Shibamoto (T). **Application of simultaneous purging and solvent extraction technique for flavour monitoring of natural products.** *Food Chemistry* 42(2): 1991: 121-127

Volatiles from bananas during ripening was investigated by a newly developed purging cum solvent-extraction apparatus. Five alkylacetates and five alkylbutyrates, responsible for characteristic flavour, increased during ripening. After 10 days, at fruits senescence period, ester formation reached max. Three alkyl increased for 5 days and plateaued until late senescence stages. Similarly fresh celery volatiles analysed by the same apparatus gave 14 terpenes and two aromatic compounds in the headspace sample. SD

FOOD PACKAGING

Packaging materials

Plastics

1537

Wille (G). **Plastic materials for wrapping of foodstuffs in progress.** *Lebensmittelindustrie* 37(5): 1990: 205 (De)

Polyethylene foil

1538

Steiner (I). **Changes of a polyethylene foil for food packing after sterilization with ozone.** *Deutsche Lebensmittel-Rundschau* 87(4): 1991: 107-112 (De)

The effect of ozone sterilizing a foil for food packaging made of polyethylene on the foil itself and respectively on the antioxidants BHT and BHA was

examined. The pentane extracts of the foil were analyzed by HPTLC preparative TLC with following IR spectroscopy of the isolated substances and GC/MS. The foil itself was analyzed by IR and microscopic methods. Beside oxidation products of BHT and BHA phthalic acid esters, alkanes, alkenes, ketones, peroxides and other substances which may cause off-flavour were found. A mechanical damage of the foil could not be proved. AS

FOOD ENGINEERING AND EQUIPMENT

1539

Silva (C), Hendrickx (M), Oliveira (F) and Tobback (P). **Optimal sterilization temperatures for conduction heating foods considering finite surface heat transfer coefficients.** *Journal of Food Science* 57(3): 1992: 743-748

Optimal sterilization temp. are defined as the processing temp. which result in a min surface cook-value after achieving the desired degree of sterility. They were calculated as a function of product heating rate, surface heat transfer coeff., initial food temp., heating medium come-up-time, z-value for the quality factor and target Fo-value. Different one-dimensional heat transfer shapes were considered. Compared to the other variables, initial temp. and heating medium come-up-time had little influence on optimal processing temp. Regression equations were developed relating optimal temp. with all relevant variables. SRA

1540

Stoforos (NG) and Merson (RL). **Physical property and rotational speed effects on heat transfer in axially rotating liquid/particulate canned foods.** *Journal of Food Science* 57(3): 1992: 749-754

Particle surface temp. were measured by liquid crystals that allowed unrestricted motion of the monitored particles. Liquid-particle film heat transfer coeff. (h_p) were considerably higher than published values which were determined with particles attached to thermocouple wires. In general, as a result of the particle motion, h_p increased with increasing rotational speed and increasing fluid viscosity. Furthermore, h_p values were higher for Teflon spheres than for Al spheres. Results for the overall (heating medium/container wall/internal liquid) heat transfer coeff. were consistent with published observations. SRA

1541

Rahul Gupta. **Use of liquid nitrogen to freeze in the freshness.** *Seafood Export Journal* 24(2): 1992: 33-39

Liquid nitrogen (LN) with its instant and extreme cold makes freezing and chilling of food faster, more controllable, economical and does not effect the food quality. The quality of LN as a refrigerant and the methods of LN application including spraying on the product using tunnel freezer, vaporizing the liquid in a forced draught and below the cold vapour over food using spiral freezer or batch freezer and immersion of the product in liquid using immersion freezer techniques are described. The operation of freezing tunnel is described in detail and the benefits derived are listed. A comparison of operating costs is also made between LN and mechanical system (fluidised bed). SRA

ENERGY IN FOOD PROCESSING

1542

Kluge (C) and Linke (L). **Consumption of heat energy for blanching.** *Lebensmittelindustrie* 37(5): 1990; 214-217 (De)

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1543

Izzo (HV) and Ho (C-T). **Ammonia affects Maillard chemistry of an extruded autolyzed yeast extract: Pyrazine aroma generation and brown colour formation.** *Journal of Food Science* 57(3): 1992; 657-659, 674

The effect of ammonia was studied by extruding mixtures of autolyzed yeast extract, glucose and ammonium bicarbonate. The resulting extrudates were compared for degree of roast aroma generation by analysis of the pyrazine volatiles formed. In addition, the overall extent of the browning reaction was measured by monitoring brown colour formation. Samples which contained ammonia exhibited a greater degree of brown colour formation; however, ammonia adversely affected the total amount of pyrazines generated. The reactive nature of the free ammonia molecule was suspected to be the governing causative factor. AS

1544

Bell (LN) and Labuza (TP). **Compositional influence on the pH of reduced-moisture solutions.** *Journal of Food Science* 57(3): 1992; 732-734

The pH of reduced-moisture systems is not the same as in hydrated systems. As aqueous phosphate

buffer solutions become conc., the pH of the system decreases. The pH of citrate buffer solutions decreases, then increases as the concn. increases. Identical buffer solutions whose a_w is reduced by the addition of nonionic solutes indicate no correlation of pH with either the a_w reduction or the change in dielectric constant. The response of pH to added solutes appears to be independent on the chemical nature of the solute and its interaction with water. This study also confirmed the limitations of several theoretical models of ionic activities. AS

1545

Slade (L) and Levine (H). **Beyond water activity: Recent advances based on an alternative approach to the assessment of food quality and safety.** *CRC Critical Reviews in Food Science and Nutrition* 30(2/3): 1991; 115-360

This review describes the concept of water dynamics and its basis as a central element of a framework based on a "food polymer science" approach to the study of structure-property relationships in food products and processes. Article covers historical backgrounds: shortcomings of the traditional approach based on the concept of a_w , an alternative approach to moisture management in food systems, the food polymer science databank and its physicochemical foundation, interpretations based on the food polymer science approach: new thoughts about old moisture management questions, conclusions and future prospects. 443 references. SRA

1546

Schultz (M), Schmidt (G) and Schmandke (H). **Effects of low methoxy pectin on protein stabilized o/w emulsions.** *Die Nahrung* 34(5): 1990; 443-447

The interaction between low methoxy pectin and faba bean globulin or the corresponding acetylated derivative in o/w emulsions is indicated by formation of hydrogen ions. For the globulin this process reaches a max within 1 day; in the case of the acetylated globulin that is valid within 6 days. These findings are related to the fact that the stability of globulin stabilized emulsions increases as a result of pectin addition whereas in acetylated globulin stabilized emulsions pectin addition leads to a decrease in stability. AS

1547

Ayyad (K), Hassanien (F) and Ragab (M). **The effect of γ -irradiation on the structure of pectin.** *Die Nahrung* 34(5): 1990; 465-468

The effect of γ -irradiation on the anhydrouronic acid (AUA) content, degree of ester methyl, MW and MW

distribution in addition to the ability to form gel in the presence of sugar and acid is studied. At dose of 2 kGy, a slight increase in the AUA content was noticed. A dramatic decrease in the MW as calculated viscometrically or from the HPGPC-elution profile was found. BV

Chemistry (Analytical)

1548

Ewing (DD) and Stepanik (TM). **Ineffectiveness of a fluorometric method for identifying irradiated food based on thymine glycol.** *Journal of Food Science* 57(3); 1992: 660-663

Under the experimental conditions employed, the fluorometric assay for thymine glycol was not suitable for detecting irradiated chicken breast meat. The method lacked both specificity (the excess O-ABA present contributed to the fluorescence signal measured) and sensitivity. SRA

1549

Beavis (R). **New methods in the mass spectrometry of proteins.** *Trends in Food Science and Technology* 2(10); 1991: 251-253

The technological bases of electrospray ionization and matrix-assisted laser desorption and practical aspects of using the methods to analyse polypeptides and proteins are the aspects reviewed in this article. 21 references. BV

1550

Ackermann (Th). **Fast chromatographic study of propolis crudes.** *Food Chemistry* 42(2); 1991: 135-138

TLC method developed to test crude preparations and their popular ethanolic extracts showed significant differences in the pattern useful for their further identification as well as their isolation. SD

1551

Asensio (JS), Barrio (CS), Juez (MTG) and Bernal (JG). **Study of the decay of diazinon and chlorpyrifos in apple samples, using gas chromatography.** *Food Chemistry* 42(2); 1991: 213-224

GC analysis (capillary column, NPD detector) in the laboratory with apple samples treated with commercial pesticides (*in vitro*) and with apple on the tree (*in vivo*) showed that both pesticides degraded more quickly *in vivo* and without penetrating the fruit in both. SD

1552

Ross (T) and McMeekin (TA). **Prediction microbiology.** *Food Australia* 43(5); 1991: 202-207

The principles and potential of predictive microbiology are illustrated by a mathematical model of square root type which predicts the growth of *Staphylococcus aureus* on seafoods. The potential also exists for remote assessment by use of modern facilities. SRA

Enzymes

1553

Leuchtenberger (A). **Current facilities using enzymes in food production. Part I.: General aspects and common fields of application.** *Ernährungsforschung* 35(6); 1990: 189-192 (De)

Recent developments in preparations and application of enzymes in industrial food processing and production are discussed with regard to starch, dairy, fat, oil, fruit and vegetable processing as well as the production of bakery goods, alcohol and beer. BV

Glucoamylases

1554

Toldra (F), Jansen (NB) and Tsao (GT). **Maltose hydrolysis kinetics with glucoamylase immobilized in porous glass fibers in tubular flow reactor.** *Die Nahrung* 34(10); 1990: 945-951

Glucoamylase has been covalently immobilized in controlled pore glass fibers packed parallel to the axis of a tubular reactor. Flow kinetic studies have been carried out for a range of flow rates and substrate concn. at 50 C and pH 4.5. Diffusion control has been found negligible with high flow rates and substrate concn. The apparent MICHAELIS constant was three orders of magnitude higher than that of the free enzyme. As flow rate and substrate concn. decrease, the extent of diffusion control increased up to a moderate degree. The immobilized glucoamylase was more stable than the free enzyme when incubated at 50 C. AS

Ethyl alcohol

1555

Kohler (K). **International status and trends of the application of raw materials for the production of**

ethanol by fermentation. *Lebensmittelindustrie* 37(5); 1990; 208-210 (De)

Microorganisms

Bacteria

Lactobacillus plantarum

1556

Garcera (MJG), Campos (M), Zuniga (M) and Uruburu (F). **Growth and metabolism of L-malic acid by *Lactobacillus plantarum* CECT 220 in a defined medium.** *Journal of Food Science* 57(3); 1992; 778-780

Malic acid can be metabolized by lactic acid bacteria by two main pathways. Previous studies in malic acid degradation by malic and malolactic enzymes in wines and complex media have not been carried out in completely defined media. Some novel aspects of growth and metabolism of a *L. plantarum* strain in a defined medium were found. One of the most relevant results was that the strain could grow with malate as sole energy source added to the medium. AS

Yersinia enterocolitica

1557

Gola (S), Scaramuzza (N), Quintavalla (S) and Campanini (M). **Combined effect of pH and a_w on the growth of *Yersinia enterocolitica* at different refrigeration temperatures.** *Industria Conserve* 66(2); 1991; 112-116 (It)

The combined effect of pH and a_w on a pool of 4 *Yersinia enterocolitica* strains in culture medium, at different refrigeration temp. (2, 4 and 8 C) and inoculum levels (10^5 cells/ml) was studied. With an inoculum of 10^5 cells/ml, min pH value for growth was found to be 4.1 at $a_w = 0.99$ and 8 C, while min a_w value at pH = 7.0 was 0.957 at 8 and 4 C and 0.971 at 2 C. Growth inhibition was observed with the following pH/ a_w combinations: at 8 C, pH 4.5/ a_w 0.971, pH 5.1 - 5.5/ a_w 0.957, pH 6-7/ a_w 0.948; at 4 C, pH 5.1-5.5/ a_w 0.971, pH 6/ a_w 0.957, pH 7/ a_w 0.948; at 2 C, pH 5.1-5.5/ a_w 0.971, pH 6-7/ a_w 0.957. The ability of *Y. enterocolitica* to grow and survive at -1 C was evaluated as a function of combined pH/ a_w . Results showed that the bacterium could grow at this temp. in about 130 days at pH 5.1/ a_w 0.995 and pH 7/ a_w 0.971. AS

Fungi

Mushrooms

1558

Brunner (KG) and Wongg (ACL). ***Staphylococcus aureus* growth and enterotoxin production in mushrooms.** *Journal of Food Science* 57(3); 1992; 700-703

Staphylococcus aureus strain FRI-100 inoculated onto mushrooms and incubated under simulated pre- and post-canning conditions, grew and produced staphylococcal enterotoxin A (SEA) at 25 C in 10% to 20% NaCl. Growth and SEA production occurred when mushrooms were stored in plastic bags at 37 C but not at 25 C. Mushrooms heat-processed at 121 C supported *S. aureus* growth and SEA production. No SEA was recovered from mushrooms inoculated with 1 or 10 ng SEA/g and heated at 121.1 C for 4.5 min. At higher inoculated SEA levels (100 and 1,000 ng/g), SEA was detectable after 10 min of heating. A more probable route of enterotoxin contamination in through post-process leakage. BV

1559

Mau (J-L), Beelman (RB) and Ziegler (GR). **1-Octen-3-ol in the cultivated mushroom, *Agaricus bisporus*.** *Journal of Food Science* 57(3); 1992; 704-706

The optimal activity of lipoxygenase-hydroperoxide lyase enzymes for 1-octen-3-ol formation was observed in cultivated mushroom over the pH range 5.0 to 7.0. The highest amount of 1-octen-3-ol was produced at pH 6.0. During post-harvest storage at 121 C, enzyme activity and 1-octen-3-ol content decreased over time. BV

1560

Fasidi (IO) and Kadiri (M). **Changes in nutrient contents of two Nigerian mushrooms, *Termitomyces robustus* (Beeli) Helm and *Lentinus subnudus* Berk, during sporophore development.** *Die Nahrung* 34(5); 1990; 415-420

Hygiene

1561

Ottaviani (F). **Microbial contamination of food contact surfaces in the food industry.** *Industria Alimentari* 30(295); 1991; 635-641 (It)

Efficiency of sanitation in meat and soft cheese factories has been tested through the parallel monitoring of residual bacteria and residual proteins onto food contact surfaces by means of: (i) TVC on standard culture media, (ii) ATP measurement by the BioOrbit bioluminometric assay, and (iii) proteins semiquantitative detection

by rapid strips (Albustix, Ames). ATP measurement is a good index of the "overall collection" of sanitized surfaces; even if not exactly correlating to microbial biomass (because of the interference of disinfectants-related sublethal stresses, which lower the light output, and of animal cells, which raise the light output) it immediately gives a reliable picture of the sanitation efficiency. AS

BIOTECHNOLOGY

1562

Kabaktschieva (G), Antanasov (W), Dimitrova (T), Atev (A) and Peev (P). **Biotechnological and technological studies with the new Bulgarian hydrolase enzyme product "Trichocease SU-2".** *Die Nahrung* 34(5); 1990; 407-413 (De)

The application of 0.20 - 0.25 Kg of "Trichocease SU" per 1000 Kg malt the lautering time of first wort and last running is reduced. The content of β -glucan and the viscosity are decreased and the amount of fermentable sugar is increased. BV

TISSUE CULTURE

○

Nil

FOOD ADDITIVES

Colourants

1563

Shi (Z), Lin (M) and Francis (FJ). **Stability of anthocyanins from *Tradescantia pallida*.** *Journal of Food Science* 57(3); 1992; 758-760, 770

The acylated, B-ring substituted anthocyanins of *Tradescantia pallida* (TPA) were extracted from the leaves with acidic water, purified on a Duolite-861 resin and incorporated into a model beverage. The beverage was composed of a citrate-phosphate buffer at pH values 3.5, 4.5 or 5.5, and 15% sucrose. Comparison samples contained cyanidin-3-glucoside from blackberries and a commercial sample of enocyanin from grapes. The TPA samples were much more stable than the other two, particularly at the higher pH values as judged by pigment retention and tristimulus colour readings. The extra absorption band of the TPA samples at pH 5.5 indicated the samples were well coloured. Addition of tannin and/or ascorbic acid resulted in marked pigment and colour loss. AS

1564

Shi (Z), Lin (M) and Francis (FJ). **Anthocyanins of *Tradescantia pallida*. Potential food colorants.** *Journal of Food Science* 57(3); 1992; 761-765

Tradescantia pallida (syn: *Setcreasea purpurea*) contained two major anthocyanins. One was cyanidin-3,7,3'-triglucoside with 3 molecules of ferulic acid and an extra terminal glucose. The other pigment was similar but without the terminal glucose unit. The nonacyl portion was identified by comparison with the pigment of *Zebrina pendula*. The acyl/aglycone and acyl/sugar ratios were determined by using internal standards and response factors with HPLC. The pigments may have potential as food colorants. AS

1565

Lin (M), Shi (Z) and Francis (FJ). **A simple method of analysis for *Tradescantia* anthocyanins.** *Journal of Food Science* 57(3); 1992; 766-767

Acylated B-ring substituted anthocyanins with a 4'-keto structure may be of interest as food colorants because at pH values above 4.0 they show an extra absorption band at 583 nm. This makes the pigments highly colored at pH > 4.0. The extra band also provides a simple method of analysis based on the difference between the absorption at 583 nm at pH 5.5 and 2.0. The ΔE 1% 1 cm for the major anthocyanin in *Tradescantia pallida* was 97. AS

1566

Shi (Z), Francis (FJ) and Duan (H). **Quantitative comparison of the stability of anthocyanins from *Brassica oleracea* and *Tradescantia pallida* in non-sugar drink model and protein model systems.** *Journal of Food Science* 57(3); 1992; 768-770

The *Tradescantia pallida* anthocyanins were about 29 times more stable in a nonsugar drink model system than red cabbage (*Brassica oleracea*) anthocyanins, and 15 times in a fish protein system. The degradation of the anthocyanins from both sources in a nonsugar drink model was logarithmic rather than linear. The mechanism for logarithmic relationship was assumed to be the difficulty of water molecules diffusion to the hydrophobic center formed by the acyl groups and the aglycone. AS

Dyes

1567

Mastowska (J) and Janiak (J). **Studies on electrochemical reduction of the food dye**

cochineal red. *Deutsche Lebensmittel-Rundschau* 87(4): 1991: 114-116

Using the method of differential pulse polarography (DPP), the effect of pH and concn. on the reduction waves of cochineal red, the main food dye, has been examined. The mechanism of reduction of this dye on the static mercury electrode has been proposed. Using the linear dependence of polarographic peak current (i) on dye concn. (c), a procedure has been developed for its quantitative detn. by the DPP method. AS

Stabilizers

Larch gum

1568

Chai (E), Stephens (L), Prescott (J) and Lane (A). **Does larch gum enhance sweetness ?**. *Food Australia* 43(7): 1991: 302-303

Panel trials demonstrated that larch gum arabinogalactan had no effect on the sweetness of sucrose or on the sweetness, pleasantness or bitter after-taste of saccharin or aspartame at concn. of either 0.007 or 2.0% (w/v). SRA

CEREALS

1569

Mongeau (R), Brassard (R), Malcolm (S) and Shah (BG). **Effect of dietary cereal brans on body weight and blood lipids in a long-term rat experiment.** *Cereal Chemistry* 68(5): 1991: 448-453

Male and female Sprague-Dawley rats were fed diets containing purified cellulose, oat bran, hard wheat bran, soft wheat bran, corn bran, or rodent lab chow at 4 or 14% total dietary fiber, and their growth and blood lipids were examined after 8 and 29 wks. Rats from each group were killed during wks 8 or 29, and tissues were collected. Diets had only a transient effect on body wt. gain, and differences were not significant at wk 29. Females had higher serum lipid levels than males at wk 29. Cholesterol levels were higher in males fed soft rather than hard wheat bran. The oat bran diet (4% fiber) mostly induced lower levels of high-density lipoprotein cholesterol than did the wheat bran diets (14% fiber). In conclusion, cereal brans had no long-term effect on body wt., but each influenced total serum lipid levels and intestinal wt. differently. AS

1570

Wood (PJ), Weisz (J) and Mahn (W). **Molecular characterization of cereal β -glucans. II. Size-exclusion chromatography for comparison of molecular weight.** *Cereal Chemistry* 68(5): 1991: 530-536

Cereal (1-3),(1-4)- β -D-glucan (β -glucan) and pullulan standards were fractionated by size-exclusion chromatography (SEC) using a HPLC gel column (TSK-60). The β -glucans were used to calibrate the column after their mol. wt. was determined by SEC with low-angle laser-light-scattering detection. Using pH 10 sodium carbonate buffer at 60 C, β -glucan was extracted from the groats and brans of 4 cvs of oats, 4 barley cvs, 4 malts, 4 wheats and 1 rye sample. Some commercial products were also analyzed. The increase in fluorescence intensity of Calcofluor in the presence of β -glucan was used for peak detection, allowing direct chromatography of the crude extracts. β -Glucans from the oat cvs and brans had the highest mol. wt. (3.00×10^6), and commercially milled samples were similar (2.70×10^6), followed by barley (2.14×10^6), malts (1.22×10^6), and rye (1.13×10^6). Wheat β -glucan was not sufficiently solubilized for detection. β -Glucan in ready-to-eat breakfast cereals ranged in mol. wt. from 0.60 to 2.93×10^6 . The method was used to monitor changes in mol. wt. of β -glucan through the digestive tract of the rat. AS

1571

Ranhotra (GS), Gelroth (JA), Glaser (BK) and Rao (CS). **Fecal bulking effect of whole grain flour from selected grains.** *Cereal Chemistry* 68(5): 1991: 556-558

In a 4-wk study, young rats were fed diets containing whole grain flour from wheat, oats, rye, or barley. At the 50% level used, these diets provided a total of 1.6, 3.0, 3.5 and 10.4 g of soluble fiber (SF) and 17.0, 10.6, 17.5 and 45.1 g of total dietary fiber (TDF), respectively. Two groups of rats were fed SF-free diets (cellulose-based) that provided 10.5 or 44.9 g of TDF. Fecal dry wt. in the grain-fed rats averaged 22.6 (wheat-fed), 15.2 (oat-fed), 20.9 (rye-fed) or 44.9 (barley-fed) g for the 4-wk period. These were poorly correlated with SF intakes but highly correlated with TDF ($r = 0.97$) and insoluble fiber ($r = 1.00$). Fecal densities were significantly lower in rats fed cellulose- or wheat-based diets than in rats fed comparable (based on TDF intake) diets based on the other three grains. AS

1572

Hekkens (WThJM) and van Twist-De Graaf (M). **What is gluten-free-levels and tolerances in the gluten-free diet ?** *Die Nahrung* 34(5): 1990: 483-487

73

eratenkorn (P), Welpert (D), El Baya (AW), Munzing
(D), Meyer (D), Zwingelberg (H). **Alterations of grain
quality during storage.** *Getreide-Mehl und Brot*
(4); 1990; 104-111 (De)

barley

74

anhotra (GS), Gelroth (JA), Astroth (K) and Bhatta
(S). **Relative lipidemic responses in rats fed
barley and oat meals and their fractions.** *Cereal
Chemistry* 68(5); 1991; 548-551

Whole meal, bran and flour from three barley
genotypes, which contained graded levels of soluble
fiber, were compared with similar commercial
fractions of oats for their effect on blood cholesterol
(CH), triglycerides, high-density lipoprotein (HDL)
cholesterol, and liver CH (test model, using
percholesterolemic rats). Whole meals of the
three barley genotypes contained 3.0, 5.2 or 6.8%
soluble fiber; oatmeal contained 3.0%. In meal-fed
rats, barley genotypes did not show a favourable
blood or liver lipid response compared with oats.
However, in bran- and flour-fed rats, the data
showed that barley exerted a profound blood and
liver CH-lowering effect compared with oat bran or
flour (blood triglyceride levels were minimally
affected). Blood HDL-CH levels were appreciably
elevated in rats fed barley bran or flour compared
with oat bran or flour. These results suggested that
barley and its major fractions (bran and flour) may
elicit different lipidemic responses and that barley
bran and flour have a more favourable effect on
blood lipids than do oat bran and flour. AS

75

Remias (M), Nagel (A) and Ledl (F). **Detection of
isochlorogenic acid in barley malt.** *Deutsche
Lebensmittel-Rundschau* 87(4); 1991; 103-106 (De)

rice

76

Khushik (RP) and Khush (GS). **Endosperm mutants
in rice: Gene expression in Japonica and Indica
backgrounds.** *Cereal Chemistry* 68(5); 1991;
437-491

Dull, sugary, shrunken, floury, white-core and
amylose extender endosperm mutants induced in
Japonica rice var. were transferred to IR36, and
Indica var., after two backcrosses. Differential
iodine staining was used to select heterozygotes
among low-amylose (dull) mutants and the
high-amylose recurrent parent (IR36). Segregation

distortion was observed in some mutants during
gene transfer from Japonica to IR36. Phenotypic
expressions of mutant genes in IR36 and Japonica
background were almost similar. However,
shrunken-1, which showed partly chalky and partly
translucent endosperm in Japonica, was completely
chalky in Indica background. Floury-2 showed
variation in phenotype, depending on the degree of
distribution of the translucent fraction. Scanning
electron photographs showed no starch granules in
the endosperm cells of sugary mutants. All the
floury-1 and white-core mutants had intermediate
amylose (20 - 25%) in the IR36 background.
Floury-2, on the other hand, produced low amylose
in both backgrounds. In general, the amylose
content of dull mutants was slightly higher in IR36
background. The amylose extender gene increased
the amylose content of IR36 from 25% to as high as
40%, an increase of about 60%. AS

1577

Feng (G-H), Chen (M), Kramer (KJ) and Reeck (GR).
 **α -Amylase inhibitors from rice: Fractionation
and selectivity toward insect, mammalian and
bacterial α -amylases.** *Cereal Chemistry* 68(5);
1991; 516-521

Rice, a cereal grain in which proteinaceous
 α -amylase inhibitors have not been well
characterized, was found to contain amylase activity
and numerous proteinaceous α -amylase inhibitors.
Inhibitory activity in crude extracts was best
detected after the extracts were heated to inactivate
the endogenous amylase activity. A relatively simple
procedure was developed to extract α -amylase
inhibitors from rice. Rice flour was extracted with
0.15M NaCl, and the crude extract was heated at 70
C for 20 min. A portion of the heat-soluble protein
was then precipitated by adding ammonium
sulphate to a concn. of 1.8M. Sodium dodecyl
sulphate polyacrylamide gel electrophoresis showed
that the ammonium sulphate precipitate was
composed of relatively small proteins with an
apparent molecular mass of approx. 14 kDa. With
two-dimensional gel electrophoresis, the
ammonium sulphate fraction was resolved into
at least eight proteins, most with pIs between 8 and
9. Further separation was done by reversed-phase
high-performance liquid chromatography
(RP-HPLC). More than 17 protein peaks were
resolved. Individual HPLC fractions were assayed
for inhibitory activities toward a group of insect (rice
weevil, red flour beetle, confused flour beetle, and
yellow mealworm), mammalian (human salivary and
porcine pancreatic), and bacterial (*Bacillus*)
 α -amylases. The results showed that 13 of the HPLC
fractions examined contained inhibitors of one or
more of the α -amylases tested. Several fractions
were selective toward insect α -amylases. Some
inhibited only one of the four insect α -amylases.

whereas others inhibited both insect and mammalian α -amylases. None of the fractions inhibited the bacterial α -amylase. AS

Rice flour

1578

Landers (PS), Gbur (EE) and Sharp (RN). **Comparison of two models to predict amylose concentration in rice flours as determined by spectrophotometric assay.** *Cereal Chemistry* 68(5); 1991: 545-548

A spectrophotometric assay was used to test two model for predicting amylose in 16 solutions containing known concn. of amylose and amylopectin and in 10 rice flours of unknown composition. The simple linear regression model based on an amylose-only standard curve over-predicted amylose in all solutions (relative bias of 7 - 329%). The model used for simultaneous estimation of amylose and amylopectin was more accurate with some slight overprediction or underprediction of amylose ($< 6\%$). The amylose-only method predicted amylose content to be 7.4% for waxy flour and 16.4 - 25.4% for nonwaxy var. Defatted flours were measured at 8.0% (waxy) and 18.4 - 29.6% (nonwaxy). Lower amylose content was measured by the simultaneous estimation method. Predictions for the flours were 0% (waxy) and 6.6 - 14.2% (nonwaxy). Defatted flours had 0% (waxy) and 9.8 - 22.0% (nonwaxy). This method resulted in greater accuracy, although use of laboratory time and resources was not changed. AS

Wheat

1579

Kaldy (MS), Rubenthaler (GI), Kereliuk (GR), Berhow (MA) and Vandercook (CE). **Relationships of selected flour constituents to baking quality in soft white wheat.** *Cereal Chemistry* 68(5); 1991: 508-512

Selected constituents of soft white wheat flour samples from various locations were examined and related to baking quality in order to identify those constituents that are associated with end-use quality. Among the selected constituents, the pentosan fractions were found to be inversely correlated with baking quality. Soluble and enzyme-extractable pentosans were negatively associated with cookie diameter. Cake volume was negatively associated with soluble, enzyme-extractable, and total pentosans. AS

1580

Mossor (G) and Skupin (J). **Biochemical characteristics of trypsin inhibitor from wheat grain, β variety.** *Die Nahrung* 34(5); 1990: 431-438

A homogenous trypsin inhibitor from wheat grain has been characterized. It is a protein of mol. wt. 9105 daltons and isoelectric point $pI = 9.5$. It belongs to arginine type inhibitors. The isolated inhibitor does neither inhibit native proteinases from wheat grain nor α -chymotrypsin, papain and pepsin. However, it inhibits some proteinases from microorganisms and moulds. It is susceptible to the action of hydrogen peroxide. The inhibitory protein consists of all amino acid residues with the largest amount of glutamic acid, proline and arginine and the lowest of histidine and tyrosine, respectively. AS

Wheat flour

1581

Symons (SJ) and Dexter (JE). **Computer analysis of fluorescence for the measurement of flour refinement as determined by flour ash content, flour grade colour, and tristimulus colour measurements.** *Cereal Chemistry* 68(5); 1991: 454-460

Millstreams from repeated pilot-scale millings of a commercially grown No. 1 Canada western red spring wheat used to measure flour refinement when selecting for aleurone and pericarp tissue by fluorescence. Measurements were averaged from 25 full-field fluorescence images using UV excitation for aleurone and blue excitation for pericarp. Pericarp fluorescence was strongly correlated ($r^2 > 0.9$) to the tristimulus colour coordinate L^* (brightness) of the flour, flour ash content, and flour grade colour. The regression equations for pericarp fluorescence to all the above refinement indexes were homogenous for replicate millings performed over a one-yr period and were not influenced by flour age. Aleurone fluorescence was also significantly correlated ($P < 0.05$) to the same flour refinement indexes. With the aleurone measurement procedure, millstreams were segregated into two groups, which made the estimation of flour refinement using aleurone more complex than for pericarp using our system. Variability in the fluorescence measurements and flour refinement indexes associated with operators, experimental design, equipment, flour moisture, and flour particle size were investigated. Tristimulus a^* and b^* values were highly sensitive to moisture changes in the flour, and b^* values sensitive to flour particle size. Tristimulus L^* values were slightly sensitive to particle size. Tristimulus L^* values were highly sensitive to particle size but insensitive to flour moisture, while relative fluorescence measurements were insensitive to both flour moisture and particle size. Instrumental

variability was associated with our fluorescence methods. AS

1582

Sievert (D), Sapirstein (HD) and Bushuk (W). **Electrophoretic study of some high molecular weight proteins of the acetic acid-insoluble residue of wheat flours.** *Cereal Chemistry* 68(5): 1991: 512-515

Acetic acid-insoluble (residue) protein fractions of flours of seven wheat varieties were studied by sodium dodecyl sulphate-polyacrylamide gel electrophoresis (SDS-PAGE). Electrophoretic patterns of unreduced SDS-buffer extracts from flour residue fractions revealed a group of relatively high mol. wt. (HMW) proteins having similar electrophoretic characteristics. The HMW proteins of one var. (Neepawa) were characterized further by two-dimensional SDS-PAGE under nonreducing and reducing conditions. The two-dimensional separation showed that the HMW proteins comprised several subunits. Three of these proteins, designated B-2, B-3 and B-4, share some correspondence with the triplet band protein and appear to be partly composed of four large subunits resolved in pairs with mol. wt. of about 56 and 52 kilodaltons. AS

1583

He (H) and Hoseney (RC). **Differences in gas retention, protein solubility and rheological properties between flours of different baking quality.** *Cereal Chemistry* 68(5): 1991: 526-530

From six hard red winter wheat flours of various baking qualities, CI 12995 and KS 501097 were selected to represent flours of good and poor quality. During breadmaking, the volume of CI 12995 dough was larger than the KS 501097 dough. The biggest difference between the two occurred during oven spring. During baking, the KS 501097 dough started to lose large quantities of CO₂ at 33 C, whereas CO₂ loss was minimal in the CI 12995 dough until 72 C. The protein solubility of heated gluten, which was higher for KS 501097 than for CI 12995, did not change over the temp. range 25-60 C. Dynamic rheological tests of gluten-water dough showed no change in rheological properties over that temp. range for either flour. However, the KS 501097 gluten-water dough had a lower G', and the KS 501097 flour-water dough had higher G' than did the corresponding samples from CI 12995. This showed that KS 501097 had a more extensible gluten but a less extensible dough and suggested that more rheologically effective cross-links or interactions existed within the KS 501097 flour-water dough. AS

1584

Nierle (W), El Baya (AW) and Brummer (JM). **Effect of emulsifying lipids on baking quality of wheat flour.** *FAT Science Technology* 93(8): 1991: 309-314 (De)

Fatty acids, monoglycerides and monoglycerin ethers were tested for their suitability as emulsifiers in bread making. The addition of myristic or palmitic acid did not affect the bread volume. Stearic acid increases the volume of bread, while the addition of oleic acid impairs the volume and the score number of the bread. Monoglycerides improve the quality of the bread. Glycerinmonomyristate has the highest effect, followed by the unsaturated monoglycerides. In these experiments, the glycerinmonooleate and glycerinmonolinoleate had higher effect on the bread volume than glycerinmonopalmitate. It has been found of interest to investigate the effect of adding monoglycerin ethers in relation to baking properties of flour. The addition of rac-1-O-dodecylglycerin and rac-1-O-tetradecylglycerin improved the bread volume for about 15% and 13%. The rac-1-O-octadecylglycerin has lower effect than the monoglycerin ethers with C₁₂ and C₁₄. AS

Wheat proteins

Gluten

1585

Freeman (TP), Shelton (DR), Bjerke (JM) and Skierkowski (K). **The ultrastructure of wheat gluten: Variations related to sample preparation.** *Cereal Chemistry* 68(5): 1991: 492-498

Fresh and heated gluten samples were prepared for scanning electron microscopy using a variety of preparation techniques. The ultrastructural characteristics of the wheat glutes were directly correlated with preparation procedures. Dehydration of gluten samples can result in major structural artifacts. Hydrated samples were prepared using a "cryopreparation" technique in which just the surface layer was sublimed. This method greatly reduced the gross artifacts of dehydration, and the hydrated samples showed a three-dimensional spongelike structure similar to that observed in fresh gluten examined with light microscopy. AS

1586

Hammam (H) and Sivik (B). **Fractionation of gluten lipids with supercritical carbon dioxide.** *FAT Science Technology* 93(3): 1991: 104-108

Ethanol extracted gluten lipids have been fractionated with supercritical CO₂ at different pressures and constant temp. The extract contains triglycerides and free fatty acids, and a more conc. fraction of polar lipids is left in the extraction vessel. While both polar and nonpolar lipids are soluble in ethanol, only nonpolar lipids are dissolved by supercritical CO₂. An addition of a small amount of ethanol to the CO₂, can, however, increase the solubility of the polar lipids. AS

MILLETS

Corn

1587

Vasishtha (AK), Madhu Bajpai and Chhaya Singh. **Spectrum variability of seeds and oil composition in Indian maize.** *Journal of the Oil Technologists Association of India* 23(2); 1991: 24-28

23 strains and 5 genetic var. of maize were tested for oil and protein contents, physical and chemical characteristics and acid composition of the oils. The (RHORYD x Vijay) F4 contained lowest oil (3.4%), and highest oil content (8.2%) was in strain Comp. R₂. The protein content was lowest (6.5%) in strain Comp. R₂ and highest (11.6%) was in strain (RHORYD x CM 202 x CM 111) F4. Sp. gr. and saponification values showed minor variations. Iodine value ranged between 105.8 and 114.6. Among the genetic var. (Hunius, Diara, Tarun, Vijai and Navin), Vijai contained highest oil (8.4%) and Hunius had highest protein (11.4%) content. The iodine value ranged between 110.3 in Diara and 113.5 in Hunius and the corresponding acid value ranged between 2.6 and 7.8. The major saturated fatty acids in the strains ranged between 8.4 and 23.4%. In phenotypic correlations, the oil content had significantly negative relationship with protein content in the 23 strains. Refractive index was positively and significantly associated with iodine value and linoleic acid. The range in value of fatty acid content was myristic 0.3 - 1.3%, palmitic 13.3 - 15.3%, stearic 3.6 - 5.1%, arachidic 0.2 - 1.0%, linoleic 41.1 - 48.8% and linolenic 1.5 - 2.3% among the 23 strains and 5 var. SRA

1588

Ortega (EI), Villegas (E), Bjarnason (M) and Short (K). **Changes in dry matter and protein fractions during kernel development of quality protein maize.** *Cereal Chemistry* 68(5); 1991: 482-486

Changes in dry matter, protein fractions, and quality during kernel development of quality protein maize (QPM) as a consequence of the interaction between the opaque-2 (O₂) gene and modifier genes were

investigated. Protein quality of QPM (i.e., total protein and zein content, tryptophan and lysine levels, and *in vitro* protein digestibility) was determined at different stages of kernel development for three normal and three QPM populations. Dry-matter accumulations of normal and QPM populations were very similar. QPM contained significantly higher amounts of tryptophan and lysine than did normal maize at early stages of kernel development. Protein-fraction distribution from 14 days after pollination through harvest showed large differences between types of maize, particularly in the prolamin components. Synthesis of zein like polypeptides during kernel development followed a characteristic pattern in the QPM endosperm. Isoelectric focusing of the zein and zein like fraction during kernel development revealed only minor differences, particularly in the zein like components. AS

1589

Wu (YV) and Berquist (RR). **Relation of corn grain density to yields of dry-milling products.** *Cereal Chemistry* 68(5); 1991: 542-544

Grain density of corn is positively correlated with yields of certain dry-milled fractions. Grain hardness of corn determined by density correlated positively with yields of total grits and with second-plus third-break grits ($P < 0.01$), and negatively with yields of degerminator fines, low-fat flour, high-fat flour and total flour ($P < 0.01$). Grain density and percent moisture were found to be negatively correlated. AS

Popcorn

1590

Song (A), Eckhoff (SR), Paulsen (M) and Litchfield (JB). **Effects of kernel size and genotype on popcorn popping volume and number of unpopped kernels.** *Cereal Chemistry* 68(5); 1991: 464-467

Four genotypes of commercial yellow popcorn (proprietary hybrids) were screened with 4.36-, 4.76-, 5.16-, 5.56-, and 5.95-mm (11/64-, 12/64-, 13/64-, 14/64- and 15/64-in) round-hole sieves to generate five size fractions. The five fractions were conditioned in an environmental chamber at 22.2 C and 70% rh, popped in a Cretors Metric Weight Volume Tester at 243 C (250-g samples), and compared to control samples containing kernels of different sizes in naturally occurring proportions. The 5.16- to 5.56-mm fraction had the highest popping volume and the lowest number of unpopped kernels (UPKs); the 4.36- to 4.75-mm fraction had the lowest popping volume and the greatest number of UPKs. For one of the var. studied, the difference

between the popping volumes of the size fractions reached as high as 11% (from 40.8 to 45.1 cm³/g). The popping volume of middle sized kernels of all the var. studied was 2% higher in general than that of the control samples. The av. number of UPKs ranged from 13 to 45. The wt. percentage of UPKs varied from 0.62 to 1.56%. The popping volume of the 5.16- to 5.56-mm fraction of different genotypes varied from 45.1 to 47.2 cm³/g. and the number of UPKs ranged from 13 to 23. Statistical analyses indicated that the popcorn genotype and kernel size significantly affected the popping volume and the number of UPKs. AS

Sorghum

1591

Singh (U) and Singh (B). **Functional properties of sorghum-peanut composite flour.** *Cereal Chemistry* 68(5): 1991: 460-463

Raw and heat-processed partially defatted peanut flour, sorghum flour, and their composite flour had different functional properties (water and oil absorption, viscosity, gelation, emulsion capacity, nitrogen solubility index [NSI] and protein dispersibility index). Water and oil absorption increased with heat processing; this effect was more pronounced in peanut than in sorghum flour. Sorghum flour samples attained a viscosity peak of 630 BU when raw and 438 BU when heat-processed. Peanut fortification reduced the viscosity peak of sorghum flour. The NSI and emulsion capacity of sorghum flour improved considerably as a result of fortification. Heat-processing reduced the NSI and emulsion capacity of peanut flour and peanut-fortified sorghum flour. The implication of these results will be realized in designing protein-enriched products based on sorghum flour, especially for sorghum-growing regions of the world. AS

1592

Suzuki (H), Hayakawa (S) and Ohtsubo (K). **Effect of extrusion cooking on the nutritive value of proteins in grain sorghum.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(6): 1991: 553-555

The nutritive value of sorghum proteins increased after extrusion cooking. An extruded product of sorghum supplemented with lysine by yeast extract showed higher nutritive value than the extruded sorghum. BV

PULSES

1593

Ketsa (S) and Poopattarangk (S). **Growth, physico-chemical changes and harvest indices of small edible-podded peas (*Pisum sativum* L. var. *macrocarpon*).** *Tropical Agriculture* 68(3): 1991: 274-278

Cowpeas

1594

Akinyele (IO). **Effect of process method on the energy and protein content, antinutritional factors and in vitro protein digestibility of cowpea milk (*Vigna unguiculata*).** *Food Chemistry* 42(2): 1991: 129-134

Extracts (hot water, cold water and boiling for 10 min. before cold water extraction) for small white and big white cvs of cowpeas showed energy 25.0 - 31.0 kcal/100 g (1 cal = 4.2 J), protein 1.0 - 2.0 g; sugars 0.5 - 3.8 g; iron 0.9 - 1.5 mg; *in-vitro* digestibility coeff. 60.5 - 81.8%, trypsin inhibiting units/ml 4.5 - 6.1, and phytic acid 61.8 - 80.5 µg/100g. Milk yield was higher in small white cv. and beany taste more in cold water extract, slight in preboiled process and absent in hot water extraction. SD

Pinto beans

1595

Borejszo (Z) and Khan (K). **Reduction of flatulence-causing sugars by high temperature extrusion of pinto bean high starch fractions.** *Journal of Food Science* 57(3): 1992: 771-772, 777

Flatulence causing sugars and sucrose of pinto bean were reduced by high temp. extrusion. Raffinose and stachyose content in HSF1 (high starch fraction) extruded at 163 C and HSF2 at 157 C were about 40 and 53% respectively of those found in whole dehulled beans. The high temp.-short time extrusion process may be used to produce bean fractions lowered in flatulence-causing sugars which might have advantages for new product development. SRA

OILSEEDS AND NUTS

1596

Elerdanz (H) and Hirsinger (F). **New materials for oleochemical reactions.** *FAT Science Technology* 92(12): 1990: 463-467 (De)

Presently oleochemistry has access to new raw materials obtained either through modifications of

existing oil crops or through selection of new crops. In this way higher yields of the fatty acid as well as fatty acids with uncommon structures were often obtained, such as the oils from new sunflower varieties with about 85% of oleic acid, or from new oil crops synthesizing functional groups in their fat molecules ready for chemical modifications, such as Coriandrum, Calendula or Limnanthes. With such new raw materials new and improved products can be derived for oleochemical applications through epoxidation, ozonolysis and sulfonation. AS

1597

Meshehdani (T), Pokorny (J), Davidek (J) and Panek (J). **Interactions of oxidized lipids with protein. Part 17. Effect of protein on the decomposition of products of the lipxygenase-catalyzed oxidation in oilseeds.** *Die Nahrung* 34(10): 1990: 915-925

Almonds

1598

Bargman (TJ), Rupnow (JH) and Taylor (SL). **IgE-binding proteins in almonds (*Prunus amygdalus*): Identification by immunoblotting with sera from almond-allergic adults.** *Journal of Food Science* 57(3): 1992: 717-720

The allergenicity of three raw almond var. (Nonpareil, Mission and Carmel) and three types of processed almonds (blanched, blanched-roasted and almond butter) were examined and compared by immunoblotting using sera eight almond-allergic individuals. Serum from the 8 individuals exhibited unique IgE-binding patterns with most of the binding activity occurring with proteins of mol. wt. between 30,000 and 70,000 daltons. Two major allergens were identified with mol. wt. of ca 70,000 and 45,000 - 50,000 daltons, with each of these proteins binding to sera from 4 of the 8 allergic individuals. The immunoreactivity of the larger one was reduced by heat processing, while the smaller one was not affected. AS

Groundnuts

1599

Rustom (IYS), Lopez-Leiva (MH) and Nair (BM). **A study of factors affecting extraction of peanut (*Arachis hypogaea* L.) solids with water.** *Food Chemistry* 42(2): 1991: 153-165

The results by fractional factorial experiments showed that temp., pH, solids-to-water ratio, hydrolysis and soaking were significant for protein extraction; temp., speed of agitation, hydrolysis and soaking for fat extraction and only hydrolysis and

soaking for carbohydrate extraction. Hydrolysis being depended on temp. and time, increased protein recovery; pH and solids-to-water ratio increased protein recovery; agitation speed increased carbohydrate and decreased protein and fat content of extracts. SD

Rapeseed

1600

schwenke (KD), Kim (YH), Kroll (J), Lange (E) and Mieth (G). **Modification of the low-molecular weight basic albumin fraction from rapeseed (*Brassica napus* L.) by acetylation. Part 2. Selected functional properties.** *Die Nahrung* 35(3): 1991: 293-301

The influence of acylation on surface functional properties, solubility and heat-induced aggregation of the low-mol. wt. basic protein fraction (napin) from rapeseed was studied. While the native protein was soluble over the whole pH-range, the exhaustively acetylated one became precipitable in the weakly acidic range. acetylation of 70 - 80% of the protein amino groups caused a stabilizing against heat-induced aggregation. The native protein had a high foam capacity and stability which were only slightly changed after acylation. Decreasing volume specific work in the order native > acetylated > succinylated protein pointed, however, to an improved foamability of acylated napin. Succinylation increased the interfacial tension on the oil/water interface, while acetylation gave both an increasing and decreasing effect depending on the degree of modification. The emulsifying capacity decreased after acylation in the order native > acetylated > succinylated. AS

Rapeseed proteins

1601

Kroll (J) and Przybilski (H). **Toxicological evaluation of rapeseed protein products by means of a thyroidea stimulating test.** *FAT Science Technology* 93(6): 1991: 228-231

On the basis of a Thyroidea Stimulating Test (TST-Test) with rats 3 rapeseed protein products from *Brassica napus*, Var. Sollux (industrial rapeseed meal = REM; rapeseed protein isolate = RPI prepared from REM by extraction, ultra- and diafiltration; rapeseed extraction residue = RER, results after the protein extraction of REM) were tested with regard to their thyreotoxic efficacy. As expected the REM shows a strong thyreotoxic effect. In contrast to that and in comparison to a control diet the RER caused no negative effects on the thyroidea functions. The RPI-diet leads possibly to

a slight impairment of metabolism of the thyroidea hormones. AS

Sesame

1602

Nagaraj (G). **Fatty acid profile of new plant types in sesame (*Sesamum indicum* L.)**. *Journal of the Oil Technologists Association of India* 23(2); 1991: 28-29

Fourteen var. of sesame including those just released and others at the advanced stages of breeding lines were analysed for oil content, refractive index, iodine value and fatty acid composition. Oil content of the var. ranged from 41.4 to 54.6%; among the released var. Rajeswari contained 54.6% oil and among the advanced breeding lines X64 contained 55% oil. Iodine value was > 106 in all var. The main fatty acids of sesame were 18:1 (45.3 - 41.9%), and 18:2 (41.7 - 37.6%). SRA

Soybeans

1603

Petres (J), Senkalszky-Akos (E) and Czukor (B). **Inactivation of trypsin inhibitor, lectin and urease in soybean by hydrothermal treatment**. *Die Nahrung* 34(10); 1990: 905-913

Soy products

Soy sauces

1604

Tien (CJ) and Chiang (BH). **Filtration of soy sauce by ceramic membrane**. *Journal of Food Science* 57(3); 1992: 740-742

Clarified soy sauce could be manufactured by heating the raw sauce, followed by filtration through 0.2 μ m pore size ceramic membrane. The filtered product was free of bacteria. The soluble components of the soy sauce passed through the membrane freely, thus the composition of the sauce was not altered, but significantly reduced turbidity. The simplicity of ceramic membrane processing and the high quality of the membrane-filtered product make it good prospect for replacing the conventional filtration method. SRA

1605

Lee (YS) and Homma (S). **Comparison of chelating activity of soy sauce and fish sauce produced in Asian countries**. *Journal of Japanese Society for*

Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi) 38(6); 1991: 515-519

Sixteen soy sauce and 4 fish sauces produced in Asian countries were subjected to electrodialysis. Their nondialyzable fraction was determined for Fe (II) chelating activity by HPLC using a gel permeation column equilibrated with 0.01 M acetate buffer (pH 4) containing 0.1 mM Fe (II) sulphate. The Fe-complex of each sample was detected in melanoidin fractions and in uncoloured fractions, and the characteristics of the sauce sample were represented by the elution profiles of Fe-complex. The results show that the amount of iron chelated per ml of electrodialyzed soy sauce ranged from 0.11 to 1.95 mg, and that of the fish sauce ranged from 0.13 to 0.50 mg. The chelating activity of soy sauce was larger than that of fish sauce. The chelating activity of the sauces was not always correlated with the colour intensity at 450 nm of the samples, since some Fe complex appeared in uncoloured fractions of HPLC analysis. AS

1606

Lee (YS) and Homma (S). **Desalting by electrodialysis to measure iron chelating activity of melanoidin in soy sauce and fish sauce**. *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(6); 1991: 556-562

Tempe

1607

Hering (L), Bisping (B) and Rehm (HJ). **Patterns and formation of fatty acids at tempe fermentation by several strains of *Rhizopus* sp.** *FAT Science Technology* 93(8); 1991: 303-308

Several fungi and bacteria have been isolated and determined from Indonesian tempe and soaking water. It could be shown that strains of *Rhizopus* sp. metabolize the soybean lipids and change the fatty acid composition only little. In principle the fatty acid composition of tempe represents a composition close to that of soybeans with an increased content of oleic acid. During a fermentation the degree of unsaturation decreased due to decreasing linoleic acid and α -linolenic acid and increasing oleic acid. The intracellular fatty acid composition of the fungi differed widely in dependence on the culture conditions used. If the fungi were forced to produce their lipids de novo, and inversion of linolenic acid position isomers appeared, γ -linolenic acid reached values up to 21%. In comparison with mycelium grown on soybeans there was a loss of linoleic acid for the benefit of all the other fatty acids, especially oleic acid. A

significant loss of total lipids during a fermentation could not be found. AS

Soy proteins

1608

Wang (CR) and Zayas (JF). **Emulsifying capacity and emulsion stability of soy proteins compared with corn germ protein flour.** *Journal of Food Science* 57(3); 1992: 726-731

Response surface methodology studies showed that both emulsifying capacity (EC) and emulsion stability (ES) increased with increasing concn. from 0.4 to 0.8% of soy flour (SF), soy concentrate (SC), soy isolate (SI) and corn germ protein flour (CGPF). In all samples, EC and ES increased as pH increased from 6 to 8. Increasing incubation temp. of protein solutions from 20 to 70 C or from 4 to 20 C did not affect EC or ES, respectively. SF had the highest EC, followed by SI, SC and CGPF. SRA

TUBERS AND VEGETABLES

Onions

1609

Mencarelli (F), De Santis (D), Massantini (R) and Contini (M). **Low O₂ concentrations use for the short term onion slices storage.** *Industria Alimentari* 29(287); 1990: 982-984 (It)

Low O₂ concn. (1 and 2%) inhibit respiration and ethylene production in onion slices stored for 6 days at 5 C in humidified continuous flow system. Weight loss is lower in these samples than in slices kept at higher concn. (4, 6, 8 and 21%) because of the different respiration rates. No difference was noted in soluble solids content but dry matter in slices was lower than in whole bulb. In contrast, higher content in pyruvic acid as indicator of pungency was evaluated in samples kept in 1 and 2% O₂. AS

Beet

1610

Hassanien (F), El-Makjzangy (A) and Avyad (K). **Application of polysaccharide enzymes in beet pulp.** *Die Nahrung* 34(5); 1990: 469-473

The application of commercial cellulolytic and pectolytic enzyme of fungal origin to hydrolysis of beet pulp is proposed in this study. The possibility of operating the hydrolysis process on a continuous basis is outlined. BV

Potatoes

1611

Abdel-Kader (ZM). **Studies on some water-soluble vitamins retention in potatoes and cow peas as affected by thermal processing and storage.** *Die Nahrung* 34(10); 1990: 899-904

Washing had no significant effect on the levels of vitamins in both potatoes and cow peas. Blanching at 100 C for 2 min. or thermal processing at 121 C for 20 min. had a great effect on the retention of ascorbic acid and thiamine and riboflavin. The retention of ascorbic acid and thiamine had been affected by the storage conditions at 25 C for 6 months; there was no significant change of riboflavin content in potatoes and cow peas. Laboratory study showed leaching was largely responsible for vitamin losses during water blanching, thermal processing and storage. BV

Sweet potatoes

1612

Shi (Z), Bassa (IA), Gabriel (SL) and Francis (FJ). **Anthocyanin pigments of sweet potatoes - *Ipomoea batatas*.** *Journal of Food Science* 57(3); 1992: 755-757, 770

The anthocyanin pigments of red sweet potato roots (*Ipomoea batatas*) were isolated, purified and identified by HPLC and conventional paper chromatographic, spectral and chemical methods. Two major pigments and two minor pigments were present in fresh tissue slices extracted with boiling 1% HAc methanol. Tissues extracted cold yielded 11 or more pigments probably from degradation of the two major pigments. One major pigment was identified as peonidin-3-diglucoside-5-glucoside with 3 molecules of ferulic acid and one molecule of caffeic acid. The other major pigment was peonidin-3-diglucoside-5-glucoside with 2 molecules of ferulic acid and one caffeic acid. AS

1613

Abdel-Kader (ZM). **Effect of boiling and baking on the content of some nutrients of sweet potatoes.** *Die Nahrung* 35(3); 1991: 321-324

The changes of proteins, minerals, sugars, starch, ascorbic acid and carotenoids during boiling and baking of sweet potatoes is studied. BV

Vegetables

1614

Ueda (S), Kuwabara (Y), Hirai (N), Sasaki (H) and Sugahara (T). **Antimutagenic capacities of different kinds of vegetables and mushrooms.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(6); 1991: 507-514

Extracts of lemonbalm, thyme, butterbur flower, momijigasa, oregano, field horsetail, shiroza, gyojaninniku and tarragon were found to possess the strong capacities of inactivating the mutagenicity of Trp-P-1, 45% of mushroom samples possessed relatively weak antimutagenic activity compared to vegetables. BV

Asparagus

1615

Dall'Aglio (G), Carpi (G), Rosa (MD) and Palmieri (L). **Dehydration of Asparagus tips and butts.** *Industria Conserve* 66(2); 1991: 125-129 (It)

Asparagus butts dehydrated by air gave satisfactory results and was suitable as a ingredient for instant soups. Combined air-drying/freeze-drying of asparagus tips gave good flavour and reconstitution properties and were less brittle than their freeze-dried only counterpart. BV

Tomatoes

1616

Stoforos (NG) and Reid (DS). **Factors influencing serum separation of tomato ketchup.** *Journal of Food Science* 57(3); 1992: 707-713

The effect of tomato cv (VF 145B-7879, VC 204, Ferry Morse E 0204 and Peto 98) breaking procedure, starting tomato paste concn., reconstituted paste, homogenization treatment, percent total and water insoluble solids and pH on serum separation of tomato ketchup was investigated. The cv, Peto 98 exhibited least serum separation and cv VF 145B-7879 exhibited the most. The two intermediate cvs, VC 204 and Ferry Morse E 0204 did not differ significantly. Medium break processing at 107.2 C after a 10 min hold at room temp. gave final product with least serum separation followed by hot break, cold break and modified hot break respectively. SRA

1617

Vicini (E) and Previdi (MP). **Gas-forming ability of osmofermentative lactic acid bacteria in tomato products.** *Industria Conserve* 66(1); 1991: 20-25 (It)

Twenty-eight osmofermentative lactobacilli and nine pediococci strains were inoculated into small jars of strained tomatoes and of tomato paste of 18, 28 and 36° Brix, vacuum sealed and incubated at 30 C for 14-28 days. 5.41%, 24.32% and 27.02% of the strains swelled the containers of strained tomatoes and tomato paste of 18 and 28° Brix, respectively. In other cases, either disappearance or remarkable reduction of vacuum was observed. In tomato paste of 36° Brix only 27% of strains were able to grow. At the same time pH changes caused by the bacteria were also assessed. Various tomato constituents were tested in MRS broth in order to identify the substances available for gas-production: 91.67% of lactobacilli and 62.5% of pediococci formed gas from citric acid and glutamic acid, respectively. AS

FRUITS

1618

Sanchez (AH), Castro (AD) and Rejano (L). **Controlled fermentation of caperberries.** *Journal of Food Science* 57(3); 1992: 675-678

1619

Owen (SR), Tung (MA) and Durance (TD). **Cutting resistance of a restructured fruit bar as influenced by water activity.** *Journal of Texture Studies* 22(2); 1991: 191-199

The cutting force increased 100 fold as the product was dried from initial cutting resistance of 4.4 N at 0.86 a_w to a max of 452 N at 0.33 a_w below which the samples were brittle with lower cutting resistance as affected by the level of apple puree and maltodextrin. SD

1620

Bhajakar (DV) and Kulkarni (PR). **Osmotolerant yeast isolates from fruit preserves.** *Die Nahrung* 35(1); 1991: 99-101

The spoilage yeasts isolated and characterised are: *Schizosaccharomyces pombe* from Amla (*Embllica officinalis*), syrup *Zygosaccharomyces bailii* from shredded mango sweet chutney (mango chunda), *Zygosaccharomyces fermentati* from pineapple murrabba (preserve) and *Citeromyces matritensis* from candied pieces of bottle gourd in syrup (petha). BV

Apples

1621

Fernandes (LI) and McLellan (MR). **Packaging effects on applesauce in multilayer polymeric films and glass.** *Journal of Food Science* 57(3): 1992: 671-674

Four different multilayer polymeric films were assessed for suitability as packaging materials for hot-filled fruit products, by determining the effect of storage time and temp. on applesauce packaged in each film type, as compared to glass. Applesauce from each package type was assessed at 5 wk intervals for changes in sensory and analytical characteristics during 15 wks storage at 20, 30, 37 and 43 C. Films containing an ethylene vinyl alcohol or PVC layer performed similarly to glass. Applesauce packaged in a nylon/linear LDPE film was less acceptable and had significantly greater browning at all temp. AS

1622

Ngadi (MO) and Correia (LR). **Solid state ethanol fermentation of apple pomace as affected by moisture and bioreactor mixing speed.** *Journal of Food Science* 57(3): 1992: 667-670

1623

Lal (BB), Maini (SB) and Thakur (GS). **Pack apples in corrugated-fibreboard cartons.** *Indian Horticulture* 36(4): 1992: 12

Different packagings such as conventional wooden box, veneer box, pine-needle box, corrugated fibre-board box and new wooden box, used for packing apples is described. Telescopic corrugated-fibre board cartons with apple trays having a dimension of 508 x 308 x 280 cm, with 125 fruits capacity is recommended for cold storage of apples. SRA

Apricots

1624

Senesi (E), Forni (E), Torreggiani (D), Croveti (R) and Bertolo (G). **Influence of pasteurization on the quality of osmodehydrated apricots packed in glass jars and flexible pouches. Part 1. Changes in chemical characteristics, colour and taste.** *Industria Conserve* 66(1): 1991: 9-13 (It)

The influence of packing (glass jars and flexible pouches) and heat treatment on some quality parameters of osmodehydrated apricot preserves was studied. Chemical (dry matter, pH, acidity, sugars), physical (colour) and sensory (colour, taste) characteristics were evaluated in the

osmodehydrated fruits as well as in the final pasteurized product during 12 months' storage at room temp. Results showed that the process was well suited to yield high-quality apricot preserves. The samples packed both in glass jars and in flexible pouches remained acceptable throughout storage. Differences in some quality parameters (instrumentally measured colour and sensory characteristics) were found only at the end of the storage period, the samples in flexible pouches being slightly preferred to those in glass. AS

1625

Forni (E), Torreggiani (D), Croveti (R), Senesi (E) and Polesello (A). **Influence of pasteurization on the quality of osmodehydrated apricots packed in glass jars and flexible pouches. Part 2. Texture changes as affected by pectic composition.** *Industria Conserve* 66(1): 1991: 14-19 (It)

Changes in pectic substances and firmness of apricots as affected by osmotic dehydration, pasteurization and packing in glass jars and flexible pouches were studied. Water-soluble pectin, oxalate-soluble pectin and residual protopectin were determined and correlated with instrumentally and sensorily measured fruit firmness. The analyses were carried out on fresh and processed apricots, as well as during storage of the latter for 12 months at room temp. Results showed a conversion of protopectin to water-soluble pectin during osmotic dehydration and, to a greater extent, during pasteurization and after 8 months of storage. However, the resulting loss of firmness remained within the limits of an acceptable product for up to 10 months, owing to the high protopectin index of the fresh fruit. The influence of protopectin on the fruit texture is evidenced by the good correlation between protopectin content and firmness measurements. Since no difference was found in the behaviour of the two packaging materials, flexible pouches can advantageously substitute glass jars. The study also showed the possibility of obtaining high-quality osmodehydrated products when fresh apricots with a high protopectin index are used. AS

Cherries

1626

Taillan (E), Ambid (C), Pech (JC) and Raynal (J). **Demethylation of pectic substances: Relationship to methylesterase activity during brine storage of cherries.** *Journal of Food Science* 57(3): 1992: 682-685

Dates

1627

Elsakr (AS). **Evaluation of date kernel oils and their effects on wheat flour characteristics.** *Grasas y Aceites* 42(3): 1991: 216-219

Aprimi dry date kernel oils have high levels of both caproic acid and stearic acid of 23.04 and 18.40% respectively, while Agwa date kernel oils have high levels of caprylic acid and capric acid of 22.31 and 12.20%. The addition of soft and dry date kernel oils did not improve the wheat flour strength but raised its resistance to extensibility. BV

Grapes

1628

Lamikanra (O), Kirby (SD) and Musingo (MN). **Muscadine grape polyphenoloxidase: Partial purification by high pressure liquid chromatography and some properties.** *Journal of Food Science* 57(3): 1992: 686-689, 695

Guavas

1629

Yen (G-C), Lin (H-T) and Yang (P). **Changes in volatile flavour components of guava puree during processing and frozen storage.** *Journal of Food Science* 57(3): 1992: 679-681, 685

Pasteurized (85 - 88 C, 24 sec) and stored (at 0 C, -10 C and -20 C for 4 months) guava (*Psidium guajava* L.) puree showed increase in aldehydes and hydrocarbons with decrease in esters when compared to unpasteurised puree. During 4 months storage at -20 C, alcohols and hydrocarbons decreased and ethyl alcohol, n-hexanal, decanoic acid, dodecanoic acid, ethyl acetate increased at 0 C and -10 C for 2 and 4 months respectively in stored pasteurized puree. SRA

Mangoes

1630

Marin (MA) and Cano (MP). **Patterns of peroxidase in ripening mango (*Mangifera indica*, L.) fruits.** *Journal of Food Science* 57(3): 1992: 690-692, 734

Chemical and biochemical changes were studied in Lippens and Smith mango cvs stored at 12 C and 85 - 90% rh. The chemical changes were similar in both varieties. During ripening pH values increased and acidity decreased, following the characteristics trend of climatic fruits. Firmness of Lippens and Smith fruit declines from 7.06 N/g to 1.70 N/g, and

7.32 N/g to 3.76 N/g respectively. The greenness of pulp diminished. Preclimateric fruit showed L (lightness) values around 80 and greenness values around -10. Postclimateric fruit showed values around 60 and -3 respectively. Preclimateric mangoes showed higher extractable protein content (0.5 mg/100 g f.w.) than ripe fruits (0.4 mg/100 f.w.). There was progressive increase in peroxidase activity at the first stage of fruit ripening (12 days cv Lippens; 10 days cv. Smith), then the activity remained constant. SRA

Muskmelons

1631

Forney (CF). **Ripening and solar exposure alter polar lipid fatty acid composition of 'honey dew' muskmelons.** *Hortscience* 25(10): 1990: 1262-1264

Polar lipids were extracted from immature through overripe 'Honey Dew' muskmelons (*Cucumis melo* L.) that were exposed to high or low levels of solar radiation. Fatty acid composition of the polar lipids changed and the percentage of unsaturated fatty acids increased as fruit ripened. The % of monounsaturated fatty acids palmitoleic and oleic acid as a percent of total fatty acids increased from 8% in melons of min maturity to > 50% in overripe melons. Also, the ratio of unsaturated to saturated fatty acids increased from 2.2 to 5.0. Total polar lipid fatty acid composition from middle mesocarp tissue (flesh) did not change as much during ripening as the polar lipid composition from the epidermis (peel). Peel tissue from the top of melons relative to the ground had unsaturation ratios of C18 fatty acids and C16 fatty acids 33% and 62% greater, respectively, than peel from the bottom of the melon. Melons of min maturity exposed to solar radiation had significantly more unsaturated C18 fatty acids than shaded melons. Increase in the percentage of unsaturated polar lipid fatty acids in 'Honey Dew' melons may relate to increases in chilling tolerance reported to occur with ripening and solar exposure. AS

Persimmons

1632

Lyon (BG), Senter (SD) and Payne (JA). **Quality characteristics of oriental persimmons (*Diospyros kaki* L. cv. Fuyu) grown in the Southeastern United States.** *Journal of Food Science* 57(3): 1992: 693-695

Strawberries

1633

Shamaila (M), Baumann (TE), Eaton (GW), Powrie (WD) and Skura (BJ). **Quality attributes of strawberry cultivars grown in British Columbia.** *Journal of Food Science* 57(3); 1992; 696-699, 720

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

1634

Klagge (VP) and Sen Gupta (AK). **Cocoa butter and the equivalents for chocolate-products.** *FAT Science Technology* 92(12); 1990; 485-492 (De)

Fatty acid and triglyceride composition of cocoa butter of various origins were analysed by GC. Significant differences were found depending on origin. Correspondingly the solid fat contents were also different. The rates of crystallization as determined by *gensen* cooling curve were also different, the softer samples crystallizing slower. In order to compensate the differences in quality of the natural cocoa butter of different origins, the CBEs (Cocoa Butter Equivalents) can be successfully incorporated in the compositions. The CBEs are produced by blending special vegetable fats of tropical origin and they not only resemble cocoa butter in its physical properties, but also in its chemical structure. These fats are allowed to be used for chocolate manufacture in England, Ireland and Denmark, but not in other EEC countries. But with the introduction of the EEC internal market, it is expected that the CBE fats will be allowed for chocolate manufacture in all EEC countries. The properties of the CBEs and their components are discussed. AS

1635

Chevalley (J). **An adaptation of the Casson equation for the rheology of chocolate.** *Journal of Texture Studies* 22(2); 1991; 219-229

The plastic viscosities and yield values for different shear rates calculated for values of Casson equation exponent in between 0.5 - 1 showed that $m = 0.6$ as the best choice for the approximate evaluation of the "true" yield. The characterization of the rheological behaviour of chocolate by yield value and plastic viscosity is practical. SD

Cocoa butter

1636

Ziegleder (G). **DSC-thermal analysis and kinetics of cocoa butter crystallization.** *FAT Science Technology* 92(12); 1990; 481-485

A DSC method for isothermal crystallization of cocoa butter is described. Valuable results can be obtained from this method about the specific crystallization tendency of cocoa butters of different origins and about temp. influence on crystallization times. The method is useful for quality control of cocoa butters and for process control during the tempering step of the industrial chocolate production. BV

Honeys

1637

Sabatier (S), Amiot (MJ), Tacchini (M) and Aubert (S). **Identification of flavonoids in sunflower honey.** *Journal of Food Science* 57(3); 1992; 773-774, 777

The flavonoids of sunflower honey were isolated and analyzed by different methods: RP-TLC, RP-HPLC/UV-Vis (diode array detection) using post-column derivatization, GC/MS. Five main compounds were identified as pinocembrin (5,7-dihydroxyflavone), pinobanksin (3,5,7-trihydroxyflavanone), chrysin (5,7-dihydroxyflavone), galangin (3,5,7-trihydroxyflavone) and quercetin (3,5,7,3',4'-pentahydroxyflavone). Two minor flavonoids were also detected: tectochrysin (5-hydroxy-7-methoxyflavone) and kaempferol (3,5,7,4'-tetrahydroxyflavone). All these compounds had been previously reported in propolis, another hive product. Honey is a source of flavonoids in the human diet. Flavonoid structures may provide an index of floral origin with further study. AS

Starches

1638

Miller (LA), Gordon (J) and Davis (EA). **Dielectric and thermal transition properties of chemically modified starches during heating.** *Cereal Chemistry* 68(5); 1991; 441-448

The dielectric properties and swelling characteristics of chemically modified starches with differing degrees of substitution and at different starch-to-water ratios were evaluated before and during heating. Thermal transitions and swelling properties of the starch granules were evaluated by differential scanning calorimetry (DSC) and microscopy, respectively. Dielectric constants (K') of

all starches remained constant during heating, and the loss factors (K") and absorptivities (1/Ri) of most starches decreased slightly during heating except during starch thermal transition times as measured by DSC. AS

1639

Czuchajowska (Z), Sievert (D) and Pomeranz (Y). **Enzyme-resistant starch. IV. Effects of complexing lipids.** *Cereal Chemistry* 68(5): 1991: 537-542

Amylomaize VII starch, autoclaved at 125 C, was reacted during cooling below 100 C with lysophosphatidyl choline (LPC), sodium stearoyl lactylate (SSL), and hydroxylated lecithin (OHL). Differential scanning calorimetry (DSC) peaks at around 95-110 C indicated formation of amylose-lipid complexes and at around 155 C indicated the presence of enzyme-resistant starch (RS). Yields of RS from complexed samples isolated by thermostable bacterial α -amylase or amyloglucosidase were lower than yields of RS from the autoclaved and cooled control. Formation of complexes competes with amylose chains involved in generation of RS. Amylose-lipid complexes are enzyme-degradable, and an increase in complexed amylose reduced yields of RS. Amylose recrystallization in RS formation is competitively affected by complexation of amylose with LPC and SSL. Results of X-ray diffraction powder crystallography were in agreement with DSC measurements. Complexes of amylose with LPC, SSL, and OHL gave rise to V-type patterns; enzymatic hydrolysis of the complexes yielded B-type RS structures. AS

1640

Saura Calixto (F) and Abia (R). **Resistant starch: An indigestible fraction of foods.** *Grasas y Aceites* 42(3): 1991: 239-242

Aspects covered in this article are: resistant starch; concept resistant starch and nutrition; formation and analysis. BV

Sugars

1641

Guu (YK) and Zall (RR). **Nanofiltration concentration effect on the efficacy of lactose crystallization.** *Journal of Food Science* 57(3): 1992: 735-739

Increases in nanofiltration concn. factor resulted in decrease of the molar ratios of the select minerals, especially K and Na to lactose. As a result, relative gross yield of lactose crystals was increased about

10% when the ultrafiltration (UF) permeate of sweet whey was treated by nanofiltration at concn. factor = 3.0. The efficiency of lactose crystallization was increased about 8% when the UF permeate of skim milk was treated under the same condition. The relative gross yield of lactose crystals was affected by the minerals present in sweet whey and skim milk, mainly by K and Na. Thus depletion of these monovalent ions by nanofiltration membrane increased the efficiency of lactose crystallization. SRA

1642

Roos (Y) and Karel (M). **Crystallization of amorphous lactose.** *Journal of Food Science* 57(3): 1992: 775-777

This study investigates the rate of crystallization of amorphous lactose at varying T-T_g (temp. of glass transition) values using differential scanning calorimetry. At constant water content crystallization increased water in the remaining amorphous matrix which decreased its T_g and accelerated crystallization. At constant rh crystallization proceeded at a rate determined by T-T_g which increased with crystallinity. Temp. dependence of time to complete crystallization was confirmed to follow Williams-Landel-Ferry equation. The results can be used to evaluate diffusion and crystallization kinetics of amorphous carbohydrates. SRA

1643

Kumar (S), Sinha (RN) and Rai (B). **Influence of micronutrient spray and red-rot development, yield attributes and juice composition of sugarcane.** *Science and Culture* 57(3/4): 1991: 83-86

Red-rot disease adversely affects sugarcane juice. Quality degrading chlorophyll content causing imbalance of mineral nutrients status. Zinc sulphate, manganese sulphate, agromin and chilamin spray improves cane growth, juice quality and chlorophyll contents in leaf laminae. SD

BAKERY PRODUCTS

Cookies

1644

Kuragano (T), Kimura (H) and Wada (Y). **Physical properties of cookies made of synthetic flour composed of soft or hard wheat proteins and starch.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(6): 1991: 476-483 (Ja)

Cookies prepared from the hard wheat flour were harder and less brittle. Cookies prepared from gliadin fraction of the soft wheat flour expanded well, while those prepared from the hard wheat flour showed low expansion ratio. A number of small peaks were observed on the surface of cookies prepared from the hard wheat flour. BV

Bread

1645

Martin (ML), Zeleznak (KJ) and Hoseney (RC). **A mechanism of bread firming. I. Role of starch swelling.** *Cereal Chemistry* 68(5); 1991: 498-503

Bread firming and starch recrystallization are not synonymous, although both occur during bread storage. Bread baked to 95 C in an electric resistance oven did not firm. Factors such as baking time and presence of shortening influenced the water-hydration capacity of the bread crumb. These factors also affected bread firmness during five days of storage. Increased baking time after the temp. reached 95 C in an electric resistance oven increased bread firmness on day 1. A proposed model maintains that bread firming results from cross-links (hydrogen bonds) between the continuous protein matrix and the discontinuous remanants of starch granules. AS

1646

Martin (ML) and Hoseney (RC). **A mechanism of bread firming. II. Role of starch hydrolysing enzymes.** *Cereal Chemistry* 68(5); 1991: 503-507

High levels (100 SKB units per loaf) of bacterial α -amylase stopped bread from firming during five days of storage. Supplementing bread with malted barley flour did not decrease the firming rate. Bread supplemented with either fungal or bacterial α -amylase contained large quantities of residual dextrins (degree of polymerization 3-9), whereas bread supplemented with malted barley flour contained only small quantities of those dextrins. β -Amylase was effective in reducing bread firmness; however, very high levels of supplementation did not completely stop the bread-firming process. Bread supplemented with pullulanase firmed at a faster rate than did the unsupplemented control bread. Dextrins of a particular size are presumably responsible for the antifirming effect. The suggested mechanism of bread firming maintains that cross-links between protein fibrils and starch granule remanants result in bread firming. Dextrins of a particular size interfere with these cross-links (hydrogen bonds) between starch and protein. AS

1647

He (H) and Hoseney (RC). **Gas retention in bread dough during baking.** *Cereal Chemistry* 68(5); 1991: 521-525

Gas retention in bread dough during baking was studied using pup loaves and an electric resistance oven. The amount of CO₂ released during the early stages of baking was small and constant. As the temp. was increased from 55 to 72 C, the rate of CO₂ release increased slightly. The major loss in gas-retaining ability of the bread dough appeared to start at 72 C. Doughs made from fractionated and reconstituted flours (gluten, starch and water-soluble fractions) containing a preheated fraction and two unheated fractions showed that when starch was preheated to above 70 C, the ability of the dough to retain gas was essentially lost. Similarly, doughs containing gluten or water solubles preheated to the same temp. retained gas. Therefore, the presence of gelatinized starch is apparently necessary for the change in gas retention of dough. A mechanism for changes in the gas-retaining ability of dough is proposed based on the dynamic rheological properties of dough during baking and the microscopic structure of baked bread. AS

1648

Damir (AA). **Effect of storage temperature and heat treatment on staling of balady bread.** *Getreide-Mehl und Brot* 44(4); 1990: 125-127 (De)

1649

El-S (N), Doma (M), Spicher (G) and Ahrens (E). **Microbiological and biochemical investigations for optimization of balady-bread. Part 2. Microbiology of the flours, Sultani-starters and yeasts for balady-bread production.** *Getreide-Mehl und Brot* 45(8); 1991: 240-247 (De)

1650

Seiffert (M) and Bormann (K). **Use of bread and rolls in cholesterol-lowering.** *Getreide-Mehl und Brot* 45(6); 1991: 181-184 (De)

Cakes

1651

Pong (L), Johnson (JM), Barbeau (WE) and Stewart (DL). **Evaluation of alternative fat and sweetener systems in cupcakes.** *Cereal Chemistry* 68(5); 1991: 552-555

A commercial fat substitute, N-Flate, and a sweetening system of 1.5% aspartame, 35.5% fructose, and 63% polydextrose (AFP) were evaluated for their potential as fat and sugar

substitutes, respectively. Four cupcake variations (shortening and sugar, shortening and AFP, N-Flate and sugar, and N-Flate and AFP) were prepared. The batter from the two variations prepared with N-Flate had a significantly higher pH and sp. gr. than the two variations prepared with shortening. A lower standing height, a firmer texture, a higher moisture content, and a darker crumb colour were observed in the two variations prepared with N-Flate. The batter from the two variations prepared with AFP also had a higher pH and sp. gr. than the two variations prepared with sugar. A lower standing height, a firmer texture, a higher moisture content, and a lighter crust colour were also observed in the two variations prepared with AFP. Interaction effects were significant for sp. gr., standing height, crust colour and tenderness. Sensory evaluation results showed that the two variations prepared with N-Flate were less tender and had less cell uniformity than those prepared with shortening. Variations prepared with AFP were less moist, had a more bitter crust and crumb, and showed greater cell uniformity than those prepared with sugar. No interaction effects were observed for any of the sensory attributes. To increase the standing height and improve the texture of cupcakes prepared with N-Flate or AFP, the relative proportions of the ingredients and the procedure may need to be altered to suit each variation. The use of flavouring agents and the elimination of aspartame from the sweetener system may help to mask or reduce the bitter aftertaste. Reduced-fat and reduced-calorie baked products offer an alternative for consumers who must restrict calorie intake. AS

Dough

1652

Skerritt (JH). **A simple antibody-based test for dough strength. I. Development of method and choice of antibodies.** *Cereal Chemistry* 68(5): 1991: 467-474

A monoclonal antibody-based enzyme-immunoassay method was developed to predict dough strength and mixing properties from the analysis of small samples of wheat flour or whole meal. The choice of antibody, grain protein extractant, and extraction technique were important. Solvents such as alkali or acid extracted. Quality-related differences in antibody binding to grain proteins extracted using sodium dodecyl sulphate (SDS) with a reducing agent (dithiothreitol, [DTT]) were noted. Proteins could be extracted by vortex; ultrasonic or high frequency homogenisation, were inferior. Quality-related differences could be measured using grain extracted a single time, although the SDS-DTT extractant provided greater differentiation when a simple

preextraction step was performed using SDS. The specificities of the antibody combinations were assessed using gluten protein fractions and genetic wheat stocks, including Chinese Spring aneuploids and near-isogenic wheats that lack certain high and low mol. wt. glutenin subunits and gliadins. The best quality differentiation was obtained using antibody combinations that bound to chromosome 1D-encoded high mol. wt. glutenin subunits. However, these antibodies bound to glutenin subunits both from var. having allelic subunits 1Dx5 and 1Dy10 and from var. having allelic subunits 1Dx2 and 1Dy12, although greater binding to proteins was seen from extracts of wheat flours that yielded stronger doughs. AS

1653

Skerritt (JH). **A simple antibody-based test for dough strength. II. Genotype and environmental effects.** *Cereal Chemistry* 68(5): 1991: 475-481

The ability of simple antibody-based tests to assess and predict specific aspects of dough quality was evaluated using flours from several sets of wheat lines and varieties. Highest correlations between the binding of glutenin-specific antibodies and dough parameters were observed with dough strength (maximal resistance) and dough mixing (development time and breakdown). Differentiation between stronger and weaker lines was greatest when the sodium dodecyl sulphate (SDS)-insoluble protein fraction was examined. Significant correlations between dough quality parameters and antibody binding were obtained with sets of varieties grown at different levels of nitrogen fertilization at the same site or in a range of environments. The test was equally useful for analyzing a diverse range of unrelated genotypes and for examining progeny from related crosses. Finally, in a set of wheats having similar high mol. wt. glutenin subunits, differences in antibody binding were obtained that were highly correlated with differences in dough properties. AS

1654

Meuser (F), Faber (Chr), Vollmar (A) and Spicher (G). **Investigations on the increase of acid production by microorganisms in a continuous working sour dough fermenter.** *Getreide-Mehl und Brot* 44(4): 1990: 121-125 (De)

MILK AND DAIRY PRODUCTS

1655

van Mil (PJJM) and Bouman (S). **Freeze concentration of dairy products.** *Netherlands Milk and Dairy Journal* 44(1): 1990: 21-31

Skim milk, homogenized whole milk and a liquid containing diacetyl were conc. in a single-stage pilot freeze concn. plant from about 10% to 36, 38 and 48% total solids respectively. No undesirable physical or chemical changes in the products was noticed. The sensory quality of the product was good and the aroma retention in the diacetyl-containing liquid was high (99.5%). The losses of milk components in the removed water remained low (100 p.p.m. or less). However, extreme care must be taken regarding the cleaning and disinfection of the equipment. BV

Milk

1656

Claassen (M) and Lawless (HT). **Comparison of descriptive terminology systems for sensory evaluation of fluid milk.** *Journal of Food Science* 57(3); 1992: 596-600, 621

1657

Chen (J-P) and Yang (B). **Enhancement of release of short-chain fatty acids from milk fat with immobilized microbial lipase.** *Journal of Food Science* 57(3); 1992: 781-782

Free fatty acid profiles of lipolyzed milk fat could be controlled by using gel-entrapped lipase. Enhancement of release of short-chain fatty acids is achievable with such immobilized enzyme systems due to the apparent difference in diffusion rates between milk fat triglycerides. SRA

1658

Jairam (BJ) and Nair (PG). **Impact of genetic variants of milk proteins on rennet curd strength and heat stability of milk.** *Indian Dairymen* 44(3); 1992: 125-128

Eleven hundred and thirteen mastitis free milk samples of individual cows of different breeds, were used for assessing the association of milk proteins and their genetic variants with the rennet firmness and heat stability of milk. β -casein produced tougher curd in Tharparkar and Red Sindhi breeds than in Brown Swiss x Sahiwal cross bred animals, but depressed the heat stability of milk in all breeds. α -lactalbumin elevated the stability of milk. None of the proteins were significantly different among the cross breeds. β -casein AB generated 7.1 g tougher curd than S₁-casein BB 4.5 g tougher curd than k casein AB and β -lactoglobulin AB. SRA

1659

Hegazi (FZ). **Kinetics of the extracellular proteinase production by the proteolytic biovar**

of *Enterococcus faecalis* in complex media and skim milk. *Die Nahrung* 35(1); 1991: 97-98

Milk products

Cheese

1660

Chandan (RC). **Cheese made by direct acidification.** *Indian Dairymen* 44(3); 1992: 133-141

Describes the directly acidified cheeses of the world which include paneer, channa and Queso Blanco or Latin American white cheese. The aspects covered about paneer are the manufacturing procedure, milk standardization, heat treatment, coagulation, draining whey, hooping, pressing and cooling, yield of paneer, changes during storage, and common defects in paneer. The manufacturing process for channa, and the factors affecting functional attributes of channa including the characteristics of coagulants and the pH and temp. of coagulation have been described. SRA

Cheddar cheese

1661

Farkye (NY) and Landkammer (CF). **Milk plasmin activity influence on Cheddar cheese quality during ripening.** *Journal of Food Science* 57(3); 1992: 622-624, 639

Up to six-fold increase in plasmin activity in milk did not significantly ($p < 0.05$) affect the composition (moisture, protein, NaCl) of cheese, although a slight increase in moisture and decrease in protein content of the cheese was noted. Proteolysis in cheese increased with plasmin activity, resulting in improved flavour and overall quality of the cheese after 3 and 6 months ripening. Consistently, increasing the plasmin activity in milk about three-fold resulted in cheese of superior sensory quality. AS

1662

Piggot (JR) and Mowat (RG). **Sensory aspects of maturation of Cheddar cheese by descriptive analysis.** *Journal of Sensory Studies* 6(1); 1991: 49-62

Cheddar cheese produced under controlled conditions was evaluated at different stages of maturation by quantitative descriptive method developed. The results clearly grouped cheese samples as vintage, mature and medium in comparison to reduced fat cheese. SD

Mozzarella cheese

1663

Jana (AH). **Browning of Mozzarella cheese - a review.** *Indian Dairyman* 44(3): 1992; 129-132

The aspects covered in the review are: significance of browning, manifestation of browning, causative factors; and measures to prevent or minimize browning. 20 references. SRA

Wheys

1664

Turgeon (SL), Gauthier (SF) and Paquin (P). **Emulsifying property of whey peptide fractions as a function of pH and ionic strength.** *Journal of Food Science* 57(3): 1992; 601-604, 634

Solubility and emulsifying properties of whey protein concentrate (WPC), heat-treated WPC (90 C, pH 2.5, 10 min), and their tryptic or chymotryptic peptide fractions obtained by ultrafiltration were measured from pH 3 to 9 at two ionic strengths ($\mu = 0$ and 0.6). There was no correlation between solubility and emulsifying capacity (EC). Heat treatment induced some conformational changes in WPC, resulting in better EC. Some peptide fractions had better EC than proteins at pH 7 and 9. Treatments resulting in more hydrophobic peptides or a higher content of larger peptides produced fractions with better emulsifying properties. pH and ionic strength affected conformation and emulsifying properties of proteins and peptides. AS

1665

Beuschel (BC), Culbertson (JD), Partridge (JA) and Smith (DM). **Gelation and emulsification properties of partially insolubilized whey protein concentrates.** *Journal of Food Science* 57(3): 1992; 605-609, 634

Ultrafiltered retentate of whey was heat-processed to prepare whey protein concentrates (WPC) with protein solubilities ranging from 27.5% to 98.1% in 0.1M NaCl, pH 7.0. Proximate and protein compositions of each WPC were determined. Properties of 20% (w/w) protein WPC gels in 0.1M and 0.6M NaCl, pH 7.0, on heating to 60, 70, 80 and 90 C and emulsification properties of WPC (0.5% (w/w) protein) in 0.1M NaCl at pH 6.0, 7.0 and 8.0 were analyzed. Gel apparent stress and strain at failure decreased and expressible moisture increased as solubility decreased from 98.1% to 41.0% at all heating temp. Emulsification Activity Index was highest at pH 7.0, emulsions were most stable at pH 8.0. AS

1666

Queguiner (C), Dumay (E), Salou-Cavalier (C) and Cheftel (JC). **Microcoagulation of a whey protein isolate by extrusion cooking at acid pH.** *Journal of Food Science* 57(3): 1992; 610-616

Whey protein isolate (WPI) extrusion-coagulated at pH 3.9 displayed a high nitrogen solubility index (NSI) (43 - 47%). Electrophoresis indicated that the β -lactoglobulin constituent was entirely soluble in 1% sodium dodecylsulphate (SDS), while scanning calorimetry revealed about 82% protein unfolding. WPI extrusion-coagulated at pH 4.5 - 6.8 displayed lower NSI (25%), were less soluble in 1% SDS, were 88% unfolded and had grainy texture. Light microscopy, centrifugation in glycerol solution, and laser diffractometry indicated the acid spread (pH 3.9) was composed of small coagulated particles, mean diameter 11.5 μ m (vol. basis). SRA

1667

Stevenson (AJ), Gladden (LF) and Fryer (PJ). **A percolation analysis of the concentration dependence of the gelation of whey protein concentrates.** *Journal of Texture Studies* 22(2): 1991; 201-218

The gelation of whey proteins, with the application of percolation theory, studied using oscillatory rheometry, and gel time results interpreted in terms of Monte Carlo simulation on a model lattice gave a satisfactory second order kinetic model. SD

Yoghurts

1668

Ariga (H), Urashima (T), Michihata (E), Ito (M), Morizono (N), Kimura (T), Takahashi (S). **Extracellular polysaccharide from encapsulated *Streptococcus salivarius* subsp. *thermophilus* OR 901 isolated from commercial yoghurt.** *Journal of Food Science* 57(3): 1992; 625-628

1669

Ramaswamy (HS) and Basak (S). **Rheology of stirred yoghurts.** *Journal of Texture Studies* 22(2): 1991; 231-241

Stirred yoghurt rheology, evaluated by Haake Rotovisco Model RV20, M-5-Osc measuring head and MV-1 rotor assembly, can be described by Herschel-Bulkley and linear models during successive upward and downward shearing sequence. Temperature dependence of rheological parameters follow Arrhenius and Turian models. By adopting the procedure desired consistency in

flavoured yoghurt based beverages can be fabricated. SD

Milk proteins

1670

Pappas (CP) and Rothwell (J). **The effects of heating, alone or in the presence of calcium or lactose, on calcium binding to milk proteins.** *Food Chemistry* 42(2): 1991: 183-201

The results showed that caseins of cow's milk when treated with Ca at 25 C for 30 min., pH 7.00 had high Ca binding capacity in the order α_{s1} -casein > β -casein > k-casein and for whey protein in the order β -lactoglobulin (β -lg) > α -lactalbumin (α -la). Presence of lactose at 25 C did not affect appreciably the Ca binding but heating of the whole casein at 80 or 95 C for 30 min. increased it. The Ca binding of α_{s1} -casein was not affected by heating in presence or absence of Ca as the accessibility and/or the number of Ca binding centres were not increased. β -casein when heated with Ca was affected in Ca binding but not β -lg. In the absence of Ca there were 21.5% increase at 80 C and 40% decrease at 95 C in Ca binding compared to unheated samples. SD

Caseins

1671

Medina (AL), Colas (B), Meste (ML), Renaudet (I) and Lorient (D). **Physicochemical and dynamic properties of caseins modified by chemical phosphorylation.** *Journal of Food Science* 57(3): 1992: 617-621

Chemical phosphorylation of bovine caseins may be useful for changing their physicochemical properties. Depending on the pH of phosphorylation of caseins by phosphorus oxychloride (POCl_3), covalent bonds between phosphate groups and different specific amino acids were formed. After casein phosphorylation, intermolecular associations may occur, as shown by electrophoresis. The solubility of modified casein was increased near the isoelectric point (pHi) and decreased at alkaline and acidic pH. In the presence of Ca^{++} at alkaline pH, the solubility of phosphorylated casein was lower than that of the control. Rheological parameters appeared to be efficient indices of structural changes occurring in proteins as a result of chemical modifications. Electron spin resonance studies showed that the flexibility of phosphorylated casein was higher than that of the control. AS

MEAT AND POULTRY

1672

Stiles (ME) and Hastings (JW). **Bacteriocin production by lactic acid bacteria: Potential for use in meat preservation.** *Trends in Food Science and Technology* 2(10): 1991: 247-251

This review summarizes the information on the bacteriocins and bacteriocinogenic lactic acid bacteria (*Lactococcus* spp., *Lactobacillus* spp., *Carnobacterium* spp., *Leuconostoc* spp. and *Pedococcus* spp.) from meat that could play an important role in meat preservation. 55 references. BV

Meat

1673

Alur (MD), Chawla (SP) and Nair (PM). **Microbiological method to identify irradiated meat.** *Journal of Food Science* 57(3): 1992: 593-595

Beef

1674

Berry (BW). **Low fat level effects on sensory, shear, cooking and chemical properties of ground beef patties.** *Journal of Food Science* 57(3): 1992: 537-540, 574

1675

Garipey (C), Amiot (J), Pommier (SA), Flipot (PM) and Girard (V). **Electrical stimulation and 48 hours aging of bull and steer carcasses.** *Journal of Food Science* 57(3): 1992: 541-544

1676

Kenney (C), Kastner (CL) and Kropf (DH). **Muscle washing and raw material source affect quality and physicochemical properties of low-salt, low-fat, restructured beef.** *Journal of Food Science* 57(3): 1992: 545-550

1677

Kenney (PB), Kastner (CL) and Kropf (DH). **Raw and preheated epimysium and gelation affect properties of low-salt, low-fat, restructured beef.** *Journal of Food Science* 57(3): 1992: 551-554

1678

Townsend (WE) and Davis (CE). **Transaminase (AST/GOT and ALT/GPT) activity in ground beef as a means of determining end-point temperature.** *Journal of Food Science* 57(3): 1992: 555-557

1679

Jackson (TC), Acuff (GR), Sharp (TR) and Savell (JW). **Contribution of *Lactobacillus plantarum* and *Leuconostoc mesenteroides* subsp. *mesenteroides* to atypical odours of beef strip loins.** *Journal of Food Science* 57(3); 1992; 785-786, 791

Pork

1680

Brewer (MS), Ikins (WG) and Harberr (CAZ). **TBA values, sensory characteristics, and volatiles in ground pork during long-term frozen storage: Effects of packaging.** *Journal of Food Science* 57(3); 1992; 558-563, 580

1681

Jackson (TC), Acuff (GR), Sharp (TR) and Savell (JW). **Volatile compounds on sterile pork loin tissue inoculated with *Lactobacillus plantarum* and *Lactobacillus fermentum*.** *Journal of Food Science* 57(3); 1992; 783-784

Products

1682

Campanini (M), Manganelli (E) and Barbuti (S). **Antimicrobial activity of *Lactobacilli* from meat product against *Listeria monocytogenes*.** *Industria Conserve* 66(2); 1991; 117-121 (It)

Thirty-eight strains of lactic acid bacteria from salami were screened for antagonistic effect against *L. monocytogenes* strains isolated from meat products. An agar-plate diffusion method in different media and an impedometric detection method using the pH-adjusted and filtered supernatant of the broth cultures of lactic acid bacteria were used. The latter method showed three strains of *Lactobacillus* spp to be very active against the *L. monocytogenes* strains tested. In particular, a strain, after growth in APT at 30 C for 24 h, adjustment of the pH of the culture to 6.5 and filtration (0.2 μ), inhibited *L. monocytogenes* growth for a long time (delays in detection time > 20 h), at pH 5.5 no growth was observed in 96 h (flat impedometric curve). The anti-*Listeria* effect of this strain was verified by plate counts of *Listeria* cells surviving during incubation at 30 C. At pH 5.5 not only was growth inhibition confirmed, but a bactericidal effect (about 3.7 decimal reductions in 120 h) was also observed. AS

Ham

1683

Lawlis (TL), Plimpton (RF), Ockerman (HW) and Parrett (NA). **Electrical stimulation and tumbling affect pre-rigor cured, sectioned and formed ham roasts.** *Journal of Food Science* 57(3); 1992; 564-568, 616

Nuggets

1684

Rhee (KS), Housson (SE) and Ziprin (YA). **Enhancement of frying oil stability by a natural antioxidative ingredient in the coating system of fried meat nuggets.** *Journal of Food Science* 57(3); 1992; 789-791

Poultry

1685

Singh (SN), Karwande (PP), Borgaonkar (PW) and Kothary (HN). **Management of poultry health.** *Poultry Gulde* 29(4); 1992; 53-59, 62

The need for the development of disease free environment in the poultry house, the application of sound management practices, disease control and prevention through vaccination are stressed. Some of the important poultry diseases have been listed along with the causative agent, symptoms, age at which infection takes place and the treatment. These include Aspergillosis, Avian influenza, Avian encephalomyelitis, Fowl cholera, Fowl pox, Coccidiosis and others. To combat these diseases, various types of vaccines available are also given. GS

1686

Verma (S). **Emerging trends in poultry processing.** *Poultry Gulde* 29(4); 1992; 65-69

The paper suggests that mechanization of broiler industry will lead to sophistication and advantages. Mechanization at different stages of transportation and processing such as pre-slaughter holding of birds; catching and transportation of broiler; hauling of broilers on overhead conveyor line; killing and bleeding; scalding and defeathering; evisceration; chilling, packaging; freezing and storage are covered. GS

Chickens

1687

Thayer (DW), Dickerson (CY), Ramkishan Rao (D), Boyd (G) and Chawan (CB). **Destruction of *Salmonella typhimurium* on chicken wings by γ -radiation.** *Journal of Food Science* 57(3); 1992; 586-589

Irradiation of poultry wings to 1.5 kGy greater than equal to 3.0 kGy provide significant protection against the presence of *Salmonellae* and reduce the population of indigenous microflora. SRA

Broilers

1688

Xiong (YL). **Thermally induced interactions and gelation of combined myofibrillar protein from white and red broiler muscles.** *Journal of Food Science* 57(3): 1992: 581-585

The gelling properties of broiler myofibrillar protein were studied by determining protein-protein interactions during heating. Breast and leg salt-soluble protein (SSP) showed 1-3 transitions in protein-protein interactions within pH 5.5-6.5. The max. transition temp. of leg SSP decreased when leg SSP was mixed with breast SSP. The combined breast/leg myofibrils formed stronger gels than leg myofibrils alone at pH greater than or equal to 6.0, and stronger gels than breast myofibrils alone at pH < 6.0. The results suggest that interactions existed between breast and leg myofibrillar proteins, and the transitions in these interactions were useful for predicting gel strength of the combined breast/leg myofibrils. AS

Ducks

1689

Lesiow (T). **Comparison of changes occurring in rheological properties of gelled tissue and model sausage prepared from duck breast muscles stored at -2 C and -18 C.** *Die Nahrung* 34(10): 1990: 927-933

Quails

1690

Renu Kumari and Mushtari Begum (J). **Sensory evaluation and microbiological quality of quail meat products.** *Indian Journal of Poultry Science* 26(3): 1991: 189-190

Microbial load on the fresh raw quail meat and its products like tandoori and battered quail at 6, 12 and 18 wk of age was studied. Quail pieces were stuffed with tandoori masala or dipped in the paste (prepared by adding spices, curd and corn starch) and kept in the refrigerator for 2 h for absorption. The pieces were deep fat fried in the cooking oil till they turned to brown colour and became crisp. Among these the products made from 18 wk old quails was highly acceptable although the age of the bird did not influence the acceptability of tandoori

and battered quail. Between the products, the battered quail had less bacterial load than the tandoori quail. Bacterial load in the product increased with the advancement of the age of the quail meat from which they were prepared. The bacterial load on raw meat was higher than the products prepared from quail meat of similar age. GS

Turkeys

1691

Pruett (WPJr), Graham (PP), Marcy (JA) and Marriot (NG). **Microbial characteristics of flaked and colour-modified turkey thigh meat.** *Journal of Food Science* 57(3): 1992: 590-592, 621

Aerobic and psychrotropic microbial counts were not different ($P > 0.05$) between intact thigh and 1-day flaked turkey (FT) or between flaked turkey and colour modified turkey (CMT) at any sampling interval. Mean coliform levels in FT did not differ ($P > 0.05$) from those in CMT after 1 day at 3 C properly performed flaking and colour modification do not compromise the microbial quality of turkey. BV

1692

Line (JE) and Harrison (MA). ***Listeria monocytogenes* inactivation in turkey rolls and battered chicken nuggets subjected to simulated commercial cooking.** *Journal of Food Science* 57(3): 1992: 787-788, 793

Cured and uncured turkey rolls inoculated with 10^7 *Listeria monocytogenes* CFU/g were vacuum packed and cooked to internal temp. of 68 and 74 C respectively and stored up to 15 wk at 4 C. Battered chicken nuggets enclosed in bags were cooked under moist heating condition in a oven to an internal temp. of 71 C. Nuggets were flushed with 30% CO₂, 70% N₂ atm. and sealed, and stored up to 30 days at 4 C. No *L. monocytogenes* were recovered from the cooked products suggesting that similar commercial processes are adequate to reduce populations of *L. monocytogenes* below detection limits. SRA

Poultry products

Eggs

1693

Akita (EM) and Nakai (S). **Immunoglobulins from egg yolk: Isolation and purification.** *Journal of Food Science* 57(3): 1992: 629-634

1694

Ikura (K), Higashiguchi (F), Kitabatake (N), Doi (E), Narita (H), Sasaki (R). **Thermally induced epitope regions of ovalbumin identified with monoclonal antibodies.** *Journal of Food Science* 57(3): 1992: 635-639

1695

Arntfield (SD) and Murray (ED). **Heating rate affects thermal properties and network formation for vicilin and ovalbumin at various pH values.** *Journal of Food Science* 57(3): 1992: 640-646

The impact of heating rate on the strength and type of networks formed with ovalbumin and vicilin were investigated at three pH levels. Changes in protein conformation and structure development were monitored with differential scanning calorimetry (DSC) and dynamic rheology. Networks were characterized by rheological properties and microstructure. Under conditions which promoted the formation of well crosslinked networks, slower heating rates resulted in stronger networks but had little impact on the type of network. As conditions were shifted to promote aggregation rather than network formation, the impact of heating rate was reduced so that for both ovalbumin and vicilin at pH 5, network characteristics were essentially independent of heating rate. AS

1696

Jarnail Singh. **Better management practices reduce egg breakage.** *Poultry Guide* 29(5): 1992: 33-34

Factors like Ca intake, age and breed of birds can improve the shell formation. Better management of poultry shed, packaging and handling practices can reduce the breakage during post lay periods, which varies between 12-15%. Selection of a good layer strain and followed by a good vaccination programme will reduce breakage. Blowing extra air over the birds helps to keep them cool and avoid panting which is essential for good shell eggs. One nest for each four or five birds should be provided and egg laying on floor should be eliminated. These are the practices to be followed to reduce egg breakage. GS

1697

Mohan (B), Thyagarajan (D), Rangareddy (P), Nagarajan (S) and Ramamurthy (N). **Assessment of quality characteristics of commercial chicken eggs.** *Indian Journal of Poultry Science* 26(3): 1991: 191-192

The chicken eggs marketed in Namakkal town, Tamil Nadu, India were assessed by the external and internal qualities. The eggs marketed are of medium size. The mean shape index was lower than the normal and the sp. gr. was nearer to normal. The albumen and yolk indices and the Haugh units of eggs were below normal values. The av. shell thickness concurred with the normal values. The albumen pH increased due to the loss of CO₂ from the eggs during storage. The mean values for shell %, albumen % and yolk % were within the normal values. GS

SEAFOODS

1698

Unger (J) and Wagner (H). **Temperature arrangement in the storage process of refrigerated sea-water and board. (Part VII).** *Lebensmittelindustrie* 37(5): 1990: 222-223 (De)

Fish

1699

Pozzo (F), Gainfaldoni (D), Tana (L), Sassetti (M) and Bono (GCD). **Contamination by Cs-137 in fish and decontamination systems.** *Industria Conserve* 66(2): 1991: 136-140 (It)

The aspects regarding contamination by Cs-137 and the efficacy of some decontamination process both in whole fish (immersion in clear water) and in fish muscle tissue (pickle, marinade) is reported. BV

Cod

1700

Jahncke (M), Baker (RC) and Regenstein (JM). **Frozen storage of unwashed cod (*Gadus morhua*) frame mince with and without kidney tissue.** *Journal of Food Science* 57(3): 1992: 575-580

The removal of kidney tissue from Atlantic cod (*G. morhua*) before deboning eliminated typical "chemical" and "petroleum" type flavours and resulted in a white ($P < 0.05$), less red and higher quality unwashed cod frame mince. Samples without kidney tissue had good frozen storage stability (at -40 C) and could be used as an ingredient in meat products. Combination of kidney tissue removal and low temp. storage were important for producing higher quality unwashed cod frame mince. SRA

1701

Ablett (RF) and Gould (SP). **Subcellular membrane integrity of Atlantic cod (*Gadus morhua*) myotomal tissue: Effects of frozen storage.** *Journal of Food Science* 57(3): 1992: 796-799

The influence of frozen storage on the ultrastructural integrity of Atlantic cod muscle tissue membranes was investigated following 3 methods of freezing and retention for 12 wk at -12 C and -35 C. In comparison to controls (0 wk), extensive membrane condensation associated with sarcoplasmic reticulum was apparent in samples stored for 12 wk at -12 C. The effects were observed to a much lesser extent in samples retained for 12 wk at -35 C. It was apparent that cryogenic, plate or blast freezing techniques showed no measurable influence on the observed condensation and that such ultrastructural changes resulted as a consequence of relatively high (-12 C) subfreezing temp. AS

1702

Shahidi (F), Naczek (M), Pegg (RB) and Synowiecki (J). **Chemical composition and nutritional value of processing discards of cod (*Gadus morhua*).** *Food Chemistry* 42(2): 1991: 145-151

Cod offal from Atlantic sp. showed 14.3% crude protein (inclusive of 2.55% collagen), 4.3% total lipid, 3.95% ash and 413 kJ/100g energy value. Based on selected amino acids the PER values were 1.88 - 2.36 for offal, 2.86 - 3.24 for cod muscle, higher content of glycine, alanine, serine, proline, hydroxy-proline and comparable fatty acids for offal. SD

Pollock

1703

Fiddler (W), Pensabene (JW), Gates (RA), Hale (M) and Jahncke (M). **N-nitrosodimethylamine formation in cooked frankfurters containing Alaska pollock (*Theragra chalcogramma*) mince and surimi.** *Journal of Food Science* 57(3): 1992: 569-571, 595

Studies were conducted to determine the feasibility of using Alaska pollock mince as a partial substitute for red meats in the formulation of frankfurters. Studies included the effects of fish form (unwashed and washed mince and surimi), percentage substitution (15 and 50) and five different methods of cooking the fish-meat franks on their N-nitrosodimethylamine (NDMA) content. The amount of formed NDMA depended on the method of cooking. Broiling and frying generated the highest levels. Microwave and boiling generated the lowest levels of NDMA, which were equivalent to the

level in uncooked franks. Broiling was observed to increase the amount of dimethyl- and trimethylamine formed. AS

1704

Pavlova (LA), Damshkaln (LG) and Vainerman (ES). **Effect of acetylation on rheological properties of fish protein isolates during heating.** *Die Nahrung* 35(1): 1991: 53-59

Results of this study indicate that regardless of the acetylation degree the protein isolates from pollack muscular tissue retain the ability to thermal gelation at temp. above 65 C. The effect of the acetylation is quite significant in the range of moderate temp. of 40-60 C: isolates acetylated to 50% and 70% display the tendency to form gel structures, but the fully acetylated proteins on the contrary acquire max fluidity under these conditions and form gels at prolonged incubation of dispersions with a high concn. only. BV

Salmon

1705

Sollid (H) and Solberg (C). **Salmon fat content estimation by near infrared transmission spectroscopy.** *Journal of Food Science* 57(3): 1992: 792-793

Near infrared transmission (NIT) spectroscopy spectrum in the region 850-1050 nm was used for prediction of the fat content in fresh salmon fillets. The square error of prediction was 0.49%, and the correlation between measured and predicted fat from the NIT-spectrum was 0.99. The only sample preparation needed was simple homogenization of the fillet prior to analysis. AS

1706

Previdi (MP), Ambroggi (F) and Gola (S). **Behaviour of *Listeria monocytogenes* in smoked salmon. Detection of *Listeria* spp., *Aeromonas hydrophila* and *Yersinia enterocolitica* in smoked fish.** *Industria Conserve* 66(2): 1991: 109-111 (It)

A microbiological study of 56 samples of different vacuum-packed smoked fish showed the presence of *L. monocytogenes* in one sample of sword fish and *L. innocua* in one of salmon and the absence of *Y. enterocolitica* and *A. hydrophila*. BV

Trout

1707

Rounds (RC), Glenn (CL) and Bush (AO). **Consumer acceptance of brown trout (*Salmo trutta*) as an alternative species to rainbow trout (*Salmo gairdneri*).** *Journal of Food Science* 57(3): 1992: 572-574

Rainbow trout and brown trout were prepared and distributed to consumers for comparative taste tests to determine consumer reaction to brown trout. In-home tests were standardized with paired samples of fish. Colour of flesh, odour, flavour, texture and overall acceptability were recorded on a 9-point Hedonic scale. Sensory results indicated that brown trout raised in farm stock ponds were more acceptable than rainbow trout from similar environments, and rainbow trout from natural winter-kill lakes were more acceptable than brown trout from the same or similar lakes. Overall, it was concluded that brown trout would be acceptable to consumers. Variations in acceptability related to water body of origin rather than to species of fish. Significant differences occurred in some characteristics but were inconsistent as to species. AS

Tuna

1708

Lo (J-R), Nagashima (Y), Tanaka (M), Taguchi (T) and Amano (K). **Effect of ultrasonication on the thermal gelation of ordinary and dark meat pastes from yellowfin tuna.** *Journal of Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi)* 38(6): 1991: 540-544

1709

Garcia Arias (MT), Castrillon (AM) and Navarro (MP). **Changes in white tuna (*Thunnus alalunga*) fat due to canning process and storage preserve.** *Grasas y Aceites* 42(3): 1991: 179-186 (Es)

Modifications in fatty acid composition in white tuna (*Thunnus alalunga*) occurring at each stage of the canning process, boiling and sterilization in soybean oil, were studied. Boiling was performed in brine and two sterilization times (55 and 90 min.) as well as the effects of storage for one yr were tested. Boiling had no effect on fatty acid composition or the n-3/n-6 ratio. However canned tuna absorbed soybean oil during sterilization, causing an increase of the percentage of C18:1, C18:2 and C18:3 and a decrease in C20:5 and C22:6. Therefore, unsaturated fatty acids to saturated fatty acids (PS/S) ratio changed and the n-3/n-6 ratio declined from 7.03 to 0.59 compared with raw tuna. Due to the whole fat enrichment, canned fish showed a

slight loss of PUFA (C20:5 and C22:6) and a increase of C18:1, C18:2 and C18:3. The latter effect was more marked in the preserves as a consequence of one yr storage. The convenience of using for canning an oil containing a lower amount of polyunsaturated fatty acid in order to remain the original n-3/n-6 ratio of the raw tuna is discussed. AS

Products

Fish oil

1710

Tulsner (M), Andree (S) and Meusel (D). **Poly-unsaturated fatty acids (PUFA) and the production concentrates from fish oil. (Part II).** *Lebensmittelindustrie* 37(5): 1990: 224-226 (De)

Surimi

1711

Ramachandran (A) and Gopalakrishna Iyer (TS). **Processing and quality standards of surimi in Japan.** *Seafood Export Journal* 24(2): 1992: 5-10

Surimi is minced and washed meat produced from any kind of fish, used as a base for producing other fishery products. Alaska pollack is the most commonly used fish for surimi production. The two methods adopted for producing frozen surimi are described and the quality standard adopted in Japan for general surimi; surimi frozen with salt and without salt are tabulated. SRA

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

1712

Ernszt (M). **Spectrophotometric determination of phenol in wort and beer.** *Lebensmittelindustrie* 37(5): 1990: 206-208 (De)

1713

Grutzmacher (J). **The biological acidification in the brewing process-method to improve the quality of beer (II).** *Lebensmittelindustrie* 37(5): 1990: 210-212 (De)

Wines

1714

Gordillo (CM), Iglesias (JLM) and Exposito (JM). **Autolysis of *Saccharomyces bayanus* during the production of cava. Part I. Proteolysis in wines.** *Die Nahrung* 34(10): 1990; 969-972

Proteolysis is a complex phenomenon corresponding to enzymatic hydrolysis of intracellular biopolymers, following cell death. The combined enzymatic action of proteases and other enzymes which modify the structure and porosity of membranes and cell walls during the autolysis of yeasts, release into the medium different molecules such as nucleotides, proteins, peptides, vitamins and amino acids which constitute precursors of specific organoleptic properties of Cava wines produced with the Champenoise method. Several authors, when studying the mechanism of yeast autolysis, point to an initiation stage consisting of membrane denaturation and a phase of cellular activation or autolytic phase which corresponds to the enzymatic hydrolysis of intracellular macromolecules. In this paper the extracellular and intracellular proteasic activities occurring during the production of Cava wines with *Sacch. bayanus* (Champenoise method), and the influence of autolytic factors (pH, ethanol and temp.) are studied. AS

1715

Puchades (R), Herrero (MA), Maquieira (A) and Antienza (J). **Simultaneous enzymatic determination of L(-) malic acid and L(+) lactic acid in wine by flow injection analysis.** *Food Chemistry* 42(2): 1991; 167-182

Non-alcoholic beverages

Fruit juices

Grape fruit juices

1716

Hernandez (E), Couture (R), Rouseff (R), Chen (CS) and Barros (S). **Evaluation of ultrafiltration and adsorption to debitter grapefruit juice and grapefruit pulp wash.** *Journal of Food Science* 57(3): 1992; 664-666, 670

Removal of limonin and naringin from grapefruit juice can be efficiently accomplished with hydrophobic resin XDA-16. Removal of naringin in grapefruit pulp wash was less efficient and required a higher resin vol. to absorb similar amounts of naringin from pulp wash than juice. Debittering processes improved the flavour of grapefruit pulp

wash. Temp. had no effect on the adsorption of limonin. However, the adsorption of naringin was less effective at low temp. The resin XAD-16 is capable of adsorbing other flavonoids such as hesperidin and naringin. SRA

Orange juices

1717

Ekasari (I), Honenderboom (CJM), Jongen (WMF) and Pilnik (W). **The use of an automated system for mutagenicity testing to assess the inner quality of heat-treated orange juices.** *Food Chemistry* 42(2): 1991; 203-212

Data provided by Cobas Bact analyser indicated that endogenous growth factors (histidine in juice and cytotoxic effects in heated juice) disturb the turbidometric assay system. Gel filtration and HPLC gave good results but the automated system may be useful to screen fractions for identification of mutagenic Maillard intermediary products. SD

Tea

1718

Kathiresan (K) and Pandian (M). **Effect of UV on quality of black tea from *Cerriops decandra*.** *Science and Culture* 57(3/4): 1991; 93-95

The quality of black tea was higher in monsoon samples than in summer samples and the trend was pronounced in samples fermented under UV irradiation for 90 - 150 min. It might be due to the higher enzyme activity of polyphenol oxidase and availability of substrates, polyphenols. SD

FATS AND OILS

1719

Hellwing (M), Morsel (J-Th) and Tulsner (M). **Lipoxygenase - their importance in lipid chemistry.** *Die Nahrung* 34(5): 1990; 449-463 (De)

The importance of lipoxygenase and its effect on food systems and reaction products generated during catalysis and enzymic processes both proceeding and following lipoxygenase reaction is highlighted. BV

1720

Pokorny (J). **Influence of lipid alteration on taste and flavour of foods.** *Die Nahrung* 34(10): 1990; 887-897 (De)

Under the conditions of food preparation and storage three various processes take place in the lipid fraction which affect flavour and taste: 1. hydrolytic, 2. oxidative, 3. pyrolytic processes. The first two may also be catalyzed enzymatically. Hydrolysis as well as oxidation have a favourable influence on the flavour. If the products, however, are formed in higher concn. they mostly cause a negative impression of a beginning rancidity. These processes leading to rancidity should be inhibited, especially during storage. AS

1721

Bariszlovich (M), Meusel (D) and Tulsner (M). **Characterization of microbial lipases. Part 2. Determination of lipase specificity.** *Die Nahrung* 35(1): 1991; 61-69 (De)

Types of lipase specificity are as follows: Positional specificity; fatty acid specificity; stereospecificity; substrate specificity (different rates of lipolysis of different glyceride classes). The acylglycerol used for detn. of lipase specificity must be so structured, that specificities are not confused and unambiguous results are obtained. Different substrates and methods for detection of specificity are reviewed and advantages and disadvantages are discussed. Positional specificity can be determined with synthetic dialkylacylglycerols and 2,3-dioleoyl butanediol. Stereospecificity can be detected with enantiomeric dialkylacylglycerols or diacylalkylglycerols. AS

Fats

1722

Rohm (H) and Raaber (S). **Difference thresholds in texture evaluation of edible fats: Firmness and spreadability.** *Journal of Food Science* 57(3): 1992; 647-650, 663

Weber ratios for firmness and spreadability of edible fats were determined at six stimulus intensities with the appropriate instrumental methods being sensitivity testing and cone penetration, respectively. The results provided good support for Weber's law except, in the case of firmness, for deviations at low stimulus intensities. The derived just noticeable difference scales approximated Fechner's law. In the linear range the mean Weber ratios were 0.196 for firmness and 0.272 for spreadability. Individual differences among the subjects up to 50% were observed. The results of previous magnitude estimation experiments and the present study suggest that firmness and spreadability are prothetic continua and that the just noticeable differences increase with increasing stimulus intensity. AS

1723

Singhal (RS), Gupta (AK) and Kulkarni (PR). **Low-calorie fat substitutes.** *Trends in Food Science and Technology* 2(10): 1991; 241-244

This article briefly describes and compares the major fat substitutes that have been developed to date. Covers 'engineered' fats and oils, carbohydrate-based fat substitutes (gums, polydextrose, starch derivatives, microcrystalline cellulose) protein-based fat substitutes and problems associated with fat substitutes. BV

1724

Anon. **Survey by a working party of the DGF, 117th report: Steaming of edible fats and oils for deodorization and deacidification.** *FAT Science Technology* 92(12): 1990; 459-463 (De)

1725

Vranac (K), Vrbaski (Z) and Budincevic (M). **Improvement of fluid acetylated monoglycerides.** *Lebensmittelindustrie* 37(5): 1990; 200-201 (De)

1726

Diedrich (M) and Henschel (K-P). **The natural occurrence of unusual fatty acids. Part 1. Odd numbered fatty acids.** *Die Nahrung* 34(10): 1990; 935-943

A literature review of the natural occurrence and effects of odd numbered fatty acids (C₁₁ to C₃₃) in microorganisms, plants and animals is presented. Not only saturated and unsaturated odd numbered fatty acids but also unsaturated fatty acids with unusual position of double bonds seem to be ubiquitous in small amounts. 88 references. AS

1727

Deidrich (M) and Henschel (K-P). **The natural occurrence of unusual fatty acids. Part 2. Even numbered fatty acids with unusual position of the double bond.** *Die Nahrung* 35(1): 1991; 85-95

Review. 87 references. BV

Shea butter

1728

Mendez (MVR), Lope (JH), Pereda (J) and Dobarganes (MC). **Assays for physical refining of shea butter.** *Grasas y Aceites* 42(2): 1991; 121-126 (Es)

The best conditions for the refining of shea butter used in cosmetic industries are defined. The

objective is to obtain a belached, deodarized fat, with a 3% max free fatty acidity and a high amount of unsaponifiable matter having minimal losses with respect to the initial sample. The following variables have been studied: phosphoric acid proportion in degumming, bleaching clays and active carbon percentages in bleaching, and temp./time in the stage of deodorization. The results demonstrate that good quality shea butter can be obtained by physical refining if the level of free fatty acid in the initial sample is lower than 5%. Otherwise, a neutralization is necessary, which should be partial in order to reduce the loss of unsaponifiable matter. AS

Oils

1729

Zhang (WB) and Addis (PB). **Evaluation of frying oil filtration systems.** *Journal of Food Science* 57(3); 1992; 651-654

Three heated oil filtration systems were evaluated: (1) paper filter; (2) paper filter plus diatomaceous earth (DE); and (3) depth filtration with a filter pad under positive pressure. Methods 1 and 2 are traditional methods. Results on tallow-cottonseed oil (90:10) and hydrogenated soybean shortening indicated that depth filtration was more effective at maintaining lipid oxidation products at low levels than methods 1 and 2. Levels of free fatty acids did not appear to differ markedly between treatments in both comparisons of depth filtration with traditional methods. Mineral analysis of both heated oil filtrate and residue removed from oil by filters revealed that depth filtration was more effective at removal of pro-oxidant transition metals than were methods 1 and 2. AS

1730

Shimada (K), Kawano (K), Ishii (J) and Nakamura (T). **Structure of inclusion complexes of cyclodextrins with triglyceride at vegetable oil/water interface.** *Journal of Food Science* 57(3); 1992; 655-658

The interfacial tension of vegetable oil (soybean oil or coconut oil)/water interface decreased with the increase of cyclodextrin (CD) concn. The interfacial excess and interfacial area were calculated from the Gibbs' adsorption equation. The average number of CD molecules including a fatty acid residue of soybean oil at the interface was estimated at 2.4 for each of α -CD and β -CD. The average number of CD molecules complexed with a fatty acid residue of coconut oil was 1.8 for α -CD and 1.7 for β -CD. These results suggested that the CD molecules formed the inclusion complex with the triglyceride according to

the chain length of fatty acid residue at the interface. AS

1731

Vrbaski (Z), Livada (M), Vranac (K), Budincevic (M) and Backovic (M). **Effects of addition of phosphatides on the formation of peroxides in hydrogenated oils.** *Die Nahrung* 34(10); 1990; 875-880 (De)

The oxidation stability of vegetable fats (m.p. 28 - 30.5 C), containing totally hydrogenated fats (iodine number up to 1.0) and lecithin, was studied. The effects studied are the concn. of additives and previous thermostating at 150 C for 60 min. The samples containing lecithin showed an increased oxidation stability at 98 and 110 C. AS

1732

Farag (RS), Hewedi (FM), Abo-Raya (SH) and El-Baroty (GSA). **A comparative study on the deterioration of oils by microwave and conventional heating.** *Grasas y Aceites* 42(3); 1991; 187-193

Exposing the refined cottonseed oil (RFO) and hydrogenated palm oil (HPO) to various heating times and microwave oven power caused hydrolysis of free fatty acids, accelerated the formation of hydroperoxides and secondary oxidation products. The development of rancidity for RFO heated by microwaves was twice faster than that produced by conventional heating. Also, the chemical values for refined cottonseed oil were much higher than that of HPO in all cases. BV

1733

Tirtiaux (A). **Dry multiple fractionation - A low cost modification process.** *FAT Science Technology* 93(11); 1991; 432-439 (De)

This paper updates the state of one technology developed by Tirtiaux, including both crystallization and separation sections. The theory of crystallization is also reviewed with regard to palm oil, milkfat, tallow, hardened fish and soybean oil etc. Finally, emphasis is made on the lower cost when replacing hydrogenation with a process involving multiple fractionation. BV

Butter oil

1734

Hammam (H), Soderberg (I) and Sivik (B). **Physical properties of butter oil fractions obtained by supercritical carbon dioxide extraction.** *FAT Science Technology* 93(10); 1991; 374-378

Butter oil has been fractionated with supercritical carbon dioxide at 40 C, 125 bar and 350 bar, respectively. The chemical composition and physical properties of the butter oil fractions have been studied with GC and differential scanning calorimetry (DSC). The polymorphism of the fractions has been studied by X-ray diffraction during crystallization. Fractionation carried out at lower extraction pressure results in higher selectivity. The first fractions collected during the extraction process contain triglycerides which are enriched in short chain fatty acids. The colourless fractions melt and crystallize at a lower temp. compared to the original butter. The residual fraction is enriched in triglycerides with long chain fatty acids, is yellow, melts and crystallizes at a higher temp. All the investigated fractions shows the β' form when crystallized from the melt. AS

SPICES AND CONDIMENTS

Spices

1735
Tietz (U) and Thomann (R). **The profile analysis-method of the sensoric evaluation of spices.** *Lebensmittelindustrie* 37(5); 1990; 202-204 (De)

1736
Sambaiah (K) and Srinivasan (K). **Effect of cumin, cinnamon, ginger, mustard and tamarind in induced hypercholesterolemic rats.** *Die Nahrung* 35(1); 1991; 47-51

The results of the present study indicate that the spices-cumin (*Cuminum cyminum*) cinnamon (*Cinnamomum zeylanicum*), ginger (*Zingiber officinale*), mustard (*Brassica nigra*) and tamarind (*Tamarindus indica*) do not have any beneficial cholesterol lowering effect when consumed at dietary levels tried (5-fold the normal human intake level). BV

Fenugreek

1737
Osman (MK) and Simon (LS). **Biochemical studies of some non-conventional sources of protein. Part 5. Extraction and characterization of protein from fenugreek seed (*Trigonella foenum* L.).** *Die Nahrung* 35(3); 1991; 303-308

Protein concentrates were prepared from fenugreek seeds by extraction with distilled water, salt solution and alkaline solution. Alkaline solution resulted in the highest extraction yield (82%). The protein

concentrate has a good digestibility (over 90%) as determined by *in vitro* enzymatic method. The protein is rich in lysine (6.51%) but poor in sulphur-containing amino acids such as methionine (0.71%), cystine (1.09%) and tryptophan (1.03%). AS

Saffron

1738
Iborra (JL), Castellar (MR), Canovas (M) and Manjon (A). **TLC preparative purification of picrocrocin, HTCC and crocin from saffron.** *Journal of Food Science* 57(3); 1992; 714-716, 731

A method for the extraction and purification of saffron secondary metabolites was developed. Among the solvents checked water was the most convenient for picrocrocin, 2,6,6-trimethyl-4-hydroxy-1-carboxaldehyde-1-cyclohexane (HTCC) and crocin extraction from saffron stigmas. The compounds were separated by analytical and preparative thin layer chromatography on aluminum oxide, and identified by spectroscopic techniques. Quantitative detn. was performed by HPLC methods with reverse phase C-18. Picrocrocin, HTCC and crocin isolated by preparative TLC showed a chromatographic purity of 98%, 96% and 70%, isolation yields being 88, 98 and 70%, respectively. The isolated compounds may be useful as food colourants. AS

SENSORY EVALUATION

1739
Tepper (BT) and Genillard-Stoerr (A). **Chemosensory changes with aging.** *Trends in Food Science and Technology* 2(10); 1991; 244-246

This review examines the chemosensory (taste, odour perception) changes that occur with aging and their possible causes and consequences and suggests alternatives for enhancing the appeal of food to elderly people. Aspects covered include: changes in taste perception, odour perception, causes of chemosensory losses, consequences of decreased chemosensory function and approaches to enhancing the chemosensory appeal of foods. 33 references. BV

1740
Daget (N) and Joerg (M). **Creamy perception. II. In model soups.** *Journal of Texture Studies* 22(2); 1991; 169-189

Optimum consistency of soups with different thickeners were at 57 - 106 mPas viscosity; flow

behaviour index between 0.12 - 0.57; maxima creaminess at 90 - 325 mPas viscosity and flow behaviour index between 0.12 - 0.42. Perceived panel thickness showed linear relationship to the logarithm of viscosity and liking consistency quadratic relation with viscosity. The optimal values of viscosity and flow behaviour index for max creaminess and best liking consistency did not coincide. SD

1741

Richez (C) and Sauvageot (F). **Effect of repeated ingestion of water and solid sucrose on the differential sensitivity to sucrose and aspartame.** *Journal of Sensory Studies* 6(1): 1991: 1-16

The differential sensitivity to sucrose or aspartame in water was studied by sequential method for water ingestion and solid sucrose ingestion every 5 min. between 9 - 12 noon. Unlike water, the ingestion of solid sucrose had maintained discriminant ability on assessors, may be due to metabolic, hedonic or others. SD

1742

Petty (MF) and Scriven (FM). **The use of Fourier analysis to compare the sensory profiles of products.** *Journal of Sensory Studies* 6(1): 1991: 17-23

Sixty female consumer panel evaluated liking for flavour and appearance, overall liking, natural flavour and odour, creaminess and water, flavour of 3 coffee whiteners and fresh milk using a 100 mm graphic scale anchored at either end. Fourier analysis showed that whitener whose profile was significantly different from that of milk was identified by Fourier plot, which could not be done by traditional univariate methods like multiple regression, principal component analysis and discriminant analysis. SD

1743

King (BM) and Arents (P). **A statistical test of consensus obtained from generalised procrustes analysis of sensory data.** *Journal of Sensory Studies* 6(1): 1991: 37-48

Matrix of maximal agreement produced by matrix matching techniques (e.g. Generalised Procrustes Analysis) represents graphically samples in consensus plots. In order to qualify this consensus as a picture of the consensus among panellists, a statistical test using Monte Carlo approach is demonstrated with a sensory profiling data of fruit flavours. SD

Nil

INFESTATION CONTROL AND PESTICIDES

1744

Giga (DP) and Canhao (JSr). **Relative toxicity and persistence of pyrethroid deposits on different surfaces for the control of *Prostephanus truncatus* (Horn) and *Sitophilus zeamais* (Motsch.).** *Journal of Stored Products Research* 27(3): 1991: 153-160

Glass, jute, plywood panels and blocks of mud were treated with permethrin (e.c.) and deltamethrin (e.c. and s.c.) at doses ranging from 0.05 to 0.5 a.i.m⁻²; and their persistence and activity against *P. truncatus* (Horn) and *S. zeamais* (Motsch) were compared. Deltamethrin s.c. was most effective on all surfaces against both insect species. *S. zeamais* was less susceptible to the pyrethroids than *P. truncatus*. BV

1745

Rameshbabu (M), Jayas (DS) and White (NDG). **Mortality of *Cryptolestes ferrugineus* (Stephens) adults and eggs in elevated carbon dioxide and depleted oxygen atmospheres.** *Journal of Stored Products Research* 27(3): 1991: 163-170

The mortality of adult insects was higher than eggs in an atm. containing 68 - 91.7% CO₂, 0 - 5.0% O₂ and the balance N₂ in a given exposure period. The mortality of eggs was more influenced by a decrease in O₂ from 4 - 0% than was the mortality of adults, whereas an increase in CO₂ from 68.0 - 91.7% increased adult mortality more than that of eggs. Atm. comp. (CO₂, O₂ and N₂) and rh (60 - 84%) affected the mortality of eggs and adults more than the other variables. Max mortality for both adults (99%) and eggs (85%) was obtained at high CO₂ (88 - 91.7%), low O₂ (0 - 0.5%), high temp. (19.5 - 20.5 C) and low rh (60.0 - 63.9%) at an exposure of 96 h. BV

1746

Rosen (P), Oestreich (R) and Tschöpe (D). **Vitamin E and diabetes.** *FAT Science Technology* 93(11): 1991: 425-431

FOOD STORAGE

1747

Nnanna (IA) and O'Neill (KL). **In vitro binding of vitamin E to selected dietary fiber sources.** *Journal of Food Science* 57(3): 1992: 721-725

An *in vitro* method was used to assess interaction between whole fiber (WF) sources and vitamin E under simulated physiological conditions (pH 2, pH 7, pH 2-7; bile salt 5.15 mM; 37 C). Dose-response and binding characteristics (via Scatchard analysis) were examined. Binding of vitamin E by lupin and gum were higher (p less than or equal to 0.05) at pH 2 and pH 7 than at the sequential treatment. Oat bran, treated at pH 7 or sequentially, showed increased (p less than or equal to 0.05) binding of vitamin E as fiber level increased (25 - 100 mg). Scatchard plots revealed two specific noninteracting binding sites for sugarbeet and barley bran. Affinities (K_d) and capacities (n) were compared among fibers. Affinities for vitamin E were: sugarbeet > oat > lupin > barley > gum. Capacities were: barley > gum > lupin > sugarbeet > oat. Vitamin E binding to DF is complex, multifactorial, and not due to a single mechanism. AS

1748

Zunft (H-J). **Food intolerance. Part I: Food as cause of individually abnormal reactions.** *Ernährungsforschung* 35(6): 1990: 179-182 (De)

1749

Hwang (J) and Kokini (JL). **Structure and rheological functions of side branches of carbohydrate polymers.** *Journal of Texture Studies* 22(2): 1991: 123-167

In the first part of the review the rheological theories of branched polymers, the rheological properties influenced by branching are discussed covering radius of gyration and intrinsic viscosity, zero-shear viscosity, elastic properties, shear rate dependence of viscosity, extensional viscosity and thermal sensitivity of viscosity. The second part covers the structural features of side branches of carbohydrates (starch, galactomannan, xanthan and pectin) and their effects on the rheological properties. 182 references. SD

1750

Zamora (R), Hidalgo (FJ) and Alaiz (M). **Biochemical changes of lipids in plant foods and feeds. II. Lipid hydroperoxides metabolism.** *Grasas y Aceites* 42(3): 1991: 230-238 (Es)

This review covers the enzymes related to the decomposition or transformation of the lipidic hydroperoxides. Lipoxygenase, hydroperoxide lyase, enal isomerase, alcohol dehydrogenase, aldehyde dehydrogenase, hydroperoxide dehydrase, alene oxide cyclase and 12-oxo-phytyldienoic acid reductase in plants are described. 62 references. BV

1751

Kovalev (NI), Karzeva (NJ), Fiterer (VO) and Smolenzeva (A). **Use of a graphic-analytical method for the optimization of multicomponent protein mixtures.** *Die Nahrung* 35(1): 1991: 3-12 (De)

The basis for the composition of protein utilization of mixtures from animal and vegetable foods is shown. The suitability of this method with regard to the amino acid composition of the raw products has been corroborated studying the growth efficiency in rats. The graphic-analytical method suggested makes it possible to ascertain the area in which the combinations of protein-containing foods regarding their protein composition reach almost the optimum. This opens the possibility to arrange food compositions in view of taste peculiarities. The method has been performed by means of a computer. AS

TOXICOLOGY

1752

Sivaswamy (SN), Balachandran (B) and Balanehr (S). **South Indian foods: Contaminants and their effects.** *Bulletin of Environmental Contamination and Toxicology* 47(2): 1991: 251-260

This paper reports the presence of polycyclic aromatic hydrocarbons (PAHs) and zearalenone and mutagenic and genotoxic effects of the South Indian food items. The dry-heated pyrolysed spices (pepper, cumin, aniseeds) showed presence of chrysene, dibenzanthracene (DBA), pyrolysed portion of chapathi, bread toast, cutlet had benzo(a)pyrene (BP), oil-fried salted and sun dried vegetables (chillies, cluster beans, sundakkai) had chrysene and BP, sun dried fishes (ribbon fish, seer fish,) had BP and DBA, decoction made from pyrolysed seeds, leaves (cumin seed, aniseed, dry ginger, mint leaves) had chrysene and DBA, pepper, mustard, heated oil were having chrysene. All the test samples displayed mutagenic activity. SRA

1753

Valletrisco (M), Casadio (S) and Stefanelli (C). **The employment of UV radiations in the destabilizing**

mycotoxin. *Industrie Alimentari* 29(288): 1990: 1111-1112 (It)

FOOD LAWS AND REGULATIONS

1754

Govindan (A) and Shashi Sareen. **Standardization in the field of processed foods.** *ISI Bulletin* 5(9): 1991: 315-318

The various Acts and Rules formulated for monitoring of food standards under the compulsory legislation in India include Prevention of Food

Adulteration Act 1954, Essential Commodities Act 1954, Fruit Products Order 1955, Solvent Extracted Oils, Deoiled meal and Edible Flour Control Order 1967 and Vegetable Products Control Order 1976, Standards Weights and Measures (Packaged commodities) Rules 1977, and Export (Quality Control and Inspection) Act 1963. Those dealing with voluntary Standardization and Certification system are Directorate of Marketing and Inspection and Bureau of Indian Standards (BSI). These are described in detail. Indian representation in various International Standardization Agencies and the functions of these Agencies have also been described. SRA

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Bachmann (MR). **The role of food processing in developing countries.** *Food Reviews International* 7(4): 1991: 387-397

This article reviews development of agroindustries in industrialised and developing countries (development of food processing systems in industrialised countries, evolution of food processing in developing countries), a food processing system for developing countries (starting from traditional system, manufacturing of low-cost food, use of locally made equipment, use of local, renewable energy sources and use of energy-saving processing techniques, waste management and treatment of effluents). 10 references. SRA

1761

Wu (R-K). **Aromatic plant materials in Chinese foods and beverages.** *Food Reviews International* 7(4): 1991: 417-443

In this paper, an attempt is made to collect and correlate scattered information on large number of traditional aromatic plant materials used in Chinese foods and beverages and are compiled in a table. Representative materials of frequent use are selected and briefly reviewed. Aspects included are: aromatic plant materials in foods (cooked dishes, staple and snack food, cakes and pastry and small

foods); aromatic plant materials (ginger, scallion, garlic, star anise and cassia, flower pepper, pepper, sesame oil, mushrooms, red jayube, pinenut, rose and osmanthus); aromatic plant materials in beverages (Chinese jasmine, *Michelia alba*, *Aglaxa odorata* and *Chrysanthemum flower*). 93 references. SRA

1762

Lee (DS), Hagggar (PE), Lee (J) and Yam (KL). **Model for fresh produce respiration in modified atmospheres based on principles of enzyme kinetics.** *Journal of Food Science* 56(6): 1991: 1580-1585

A respiration model, based on enzyme kinetics, was proposed for predicting respiration rates of fresh produce as a function of O₂ and CO₂ concn. In this model, the dependence of respiration on O₂ was assumed to follow a Michaelis-Menten type equation ($r = V_m[O_2]/(K_m + [O_2])$), and the effect of CO₂ on respiration to follow an uncompetitive inhibition model ($r = V_m[O_2]/(K_m + (1 + [CO_2]/K_i)[O_2])$). The model predictions agreed well with published data for a variety of commodities and with experimental data for cut broccoli. Fresh produce respiration rates (O₂ consumption or CO₂ evolution) at various O₂ and CO₂ concn., as well as transient and equilibrium gas concn. within permeable packages, could be accurately predicted with the model equations. AS

FOOD PROCESSING

1763

Dennis (C). **Processing to provide consistent quality for the consumer.** *Food Science and Technology Today* 4(1): 1990: 28-32

1764

McFarlane (I). **In-line measurement of product quality for process control.** *Food Science and Technology Today* 4(1): 1990: 33-36

FOOD PACKAGING

1765

Labuza (TP). **Active food packaging technologies.** *Food Science and Technology Today* 4(1): 1990: 53-56

1766

Murthy (RAN), Baldev Raj, Vijayalakshmi (NS) and Veerraju (P). **Effect of volume of food simulating**

solvents in migration tests. *Deutsche Lebensmittel-Rundschau* 86(12): 1990; 392-394

Migration tests were carried out under IS test conditions employing different amounts of food simulating liquids (FSL) at 0.31, 0.37, 0.4, 0.47, 0.5, 0.66, 1.0 and 2.0 ml/sq.cm. Results showed that for a given test condition and packaging material, the vol. of FSL had no effect in the range of 0.5 - 2.0 ml/sq.cm on the amount of the migration. BV

1767

Gupta (M), Singh (B) and Jain (RK). **A study on potability and mechanical behaviour of plastic water storage tanks.** *Research and Industry, India* 37(1): 1992; 21-24

Linear low density polyethylene (LLDPE) water storage tanks having capacity of 200 - 500 l and wall thickness of 4 - 5 mm were analysed for overall migration of leachable additives at different temp. and extraction duration. Addition of carbon black reduces the tensile properties of LLDPE. The overall migration of leachable additives increased with the increase of temp. and extraction period. pH and dissolved solid of water samples drawn from filled tanks after 1 day and 10 days storage period were almost similar and within permissible limits. Bacteriological study also did not show any alteration in bacterial colony after 10 days of water storage in tanks. Potability and mechanical characteristics of LLDPE tanks satisfy BIS specification requirements. GS

FOOD ENGINEERING AND EQUIPMENT

1768

Marques (JPM), Le Loch (C), Wolff (E) and Rutledge (DN). **Monitoring freeze-drying by low resolution pulse NMR: Determination of sublimation endpoint.** *Journal of Food Science* 56(6): 1991; 1707-1710, 1728

An NMR method was developed for detection of the sublimation period endpoint during the freeze-drying of potato pieces. Longitudinal (T_1) and transverse (T_2) relaxation times were estimated using rapid NMR methods. Samples were immediately examined to determine presence of a frozen core. The plot of T_1 vs T_2 showed an abrupt increase at a point corresponding to the complete elimination of the frozen core. Similar T_1 vs T_2 curves were observed when monitoring freeze-drying of a single potato piece inside the NMR probe-head. The detection of an anomalous freeze-drying is possible by monitoring the T_1 , the T_2 or the free induction decay signal. AS

1769

Hayakawa (K-I), Wang (J) and Gilbert (SG). **Simultaneous heat processing of high- and low-acid foods in semirigid containers - A theoretical analysis.** *Journal of Food Science* 56(6): 1991; 1714-1717

A one meal-set of military ration consists of heat sterilized, high- and low-acid foods in semirigid containers. These foods are processed separately because of large differences in lethality requirements. The feasibility of simultaneously processing a meal-set consisting of chili con carne, white rice, and sliced peach in syrup to minimize costs was examined. Simultaneous processing was not possible by adjusting initial temp. according to computer-simulation using food temp. data collected experimentally. However, it was possible when the container for peaches was insulated properly with expanded polystyrene. Proper insulation thickness was slightly dependent on z value of the target factor. AS

Equipments

1770

Zaman (S), Rotstein (E) and Valentas (KJ). **Can material influence on the performance of rotating cookers.** *Journal of Food Science* 56(6): 1991; 1718-1724

The rotational performance of ETP (electro-tin-plated) and TFS (tin-free-steel) cans was studied in pilot and commercial cookers, and in a cooker simulator. TFS cans rotated less than ETP cans in both commercial and pilot cookers. Commercial cookers showed less can rotations than corresponding pilot scale experiments. The simulator predicted an exponential decay in lethality with decreased can r.p.m. Polymer coated cans conditioned the cooker surface and the extent depended on contact time. Heat transfer depended on can rotation and could be predicted with a suitable correlation. The correlation was used to predict lethality performance as well as exit temp. of processed foods. AS

ENERGY IN FOOD PROCESSING

Nil

Chemistry

1771

Davidek (T), Velisek (J), Davidek (J) and Pech (P). **Glycylglycine-derived 1,3-disubstituted imidazole in nonenzymatic browning reactions.** *Journal of Agricultural and Food Chemistry* 39(8); 1991: 1374-1377

5-[3-(3-Aza-4-carboxy-2-oxo-1-butyl)-1-imidazolium]-3-aza-4-oxopentanoate was identified in a model reaction mixture containing glycylglycine, glyoxal, and formaldehyde. The structure of this compound was elucidated from the measured mass, ^1H NMR, and ^{13}C NMR spectral data. The stability of the compound as well as the dependence of its formation on pH value of the reaction mixture was studied. This 1,3-symmetrically substituted imidazole represents a new imidazole derivative not previously described either as a product of nonenzymatic browning reactions or as a product of any other reaction. AS

1772

Canjura (FL), Schwartz (SJ) and Nunes (RV). **Degradation kinetics of chlorophylls and chlorophyllides.** *Journal of Food Science* 56(6); 1991: 1639-1643

Thermal degradation of chlorophylls and chlorophyllides in spinach puree was studied from 100 to 145 C (2-25 min.) for chlorophylls and from 80 to 115 C (2.5 - 39 min.) for chlorophyllides. The derivatives formed were: pheophorbides, pyropheophorbides, pheophytins and pyropheophytins. Degradation kinetics of chlorophylls and chlorophyllides followed a first-order kinetic model. Reaction rate data showed that the 'a' form of both chlorophylls and chlorophyllides degraded more rapidly than the 'b' form. Chlorophyllides were less stable than chlorophylls. Activation energies ranged from 15.0 to 22.8 Kcal/mol. A kinetic compensation effect was observed for both chlorophylls and chlorophyllides with an isokinetic temp. of 169.8 C. The relative stability of these compounds suggests that methods to maximize chlorophyllides would not be effective for improving green colour stability. AS

1773

Degnan (AJ), Von Elbe (JH) and Hartel (RW). **Extraction of annatto seed pigment by supercritical carbon dioxide.** *Journal of Food Science* 56(6); 1991: 1655-1659

Operating pressures ranged 3000 - 7000 psi and temp. 40 - 55 C. Max solubility of pure bixin was 0.003 and of annatto seed pigment 0.26 mg/g CO_2 . Analyses of annatto seed pigment from supercritical carbon dioxide extractions showed only α - and β -bixin present. Only bixin was extracted from mixed samples consisting of bixin and norbixin. No thermal degradation product was detected in samples extracted within the temp. range used. Increased temp. resulted in increased pigment/g CO_2 at all pressures. Isothermal increases in pressure did not increase pigment/g CO_2 . Efficiency of annatto pigment extraction was increased in the presence of an oil. AS

1774

Tsoubeli (MN) and Labuza (TP). **Accelerated kinetic study of aspartame degradation in the neutral pH range.** *Journal of Food Science* 56(6); 1991: 1671-1675

The degradation of aspartame in solution as a function of temp. (70 - 100 C), buffer concn. (0.01 - 0.1 M phosphate), and pH (6 - 7) was studied in order to estimate losses during thermal processing and storage of aseptic milk-based drinks. Prior data have been mostly on acid carbonated beverages. First order rate constants were obtained in all the conditions with activation energies in the range 14 - 20 kcal/mole. An increase in both pH and buffer concn. caused an increase in rate of loss. These data were used to predict losses that would occur during pasteurization and sterilization conditions. Experiments at 4 and 30 C showed significant losses would occur during 4 and 30 C temp. storage and extrapolation from high temp. predicted faster degradation rates than those found. AS

1775

Ang (JF). **Water retention capacity and viscosity effect of powdered cellulose.** *Journal of Food Science* 56(6); 1991: 1682-1684

Powdered cellulose is a natural β -1,4-glucan polymer. It is 99% total dietary fiber (dwb) and has many uses as a low-calorie food ingredient. Depending on its fiber length, cellulose can retain 3.5 to 10 times its wt. in water. Temp. and pH exerted small effects on water retention capacity. A powdered cellulose with a 110-micron fiber length significantly increased viscosity. Its ability to increase viscosity was further magnified in solutions containing low amounts of stabilizers. This fiber may act synergistically with other stabilizers to increase viscosity. AS

1776

Hamidani (AU) and Sanghavi (JR). **Improvement in the quality of salt from inland brine of**

The edible salt obtained from inland brine in Kharaghoda area of Bhavnagar, Gujarat State is of inferior quality as it contains higher (content 1.5%) amounts of calcium sulphate impurity. Calcium sulphate to the extent of 48% was separated out at 24.8°Be' brine density from subsoil brine whereas in case of sea brine it was 83.8%. The total calcium sulphate separation from subsoil brine is also related to the total sulphate ion concn. of the brine. By adding magnesium sulphate and sodium sulphate to the subsoil brine about 55% of the total calcium sulphate content of the 24.0°Be' subsoil brine could be separated till the density of the brine attained 24.8°Be'. By adding sea bittern about 50% of calcium sulphate separation could be obtained till 24.5°Be' density. KAR

Chemistry (Analytical)

1777

Saad (BB) and Jashinta Devi. **Determination of sodium in processed foodstuffs using a bis(12-crown-4) derivative-based poly(vinyl chloride) membrane electrode.** *Journal of the Science of Food and Agriculture* 56(3); 1991: 403-406

A poly(vinyl chloride) matrix membrane Na selective electrode based on bis[(12-crown-4)ylmethyl] 2-dedecyl-2-methylmalonate ((12-crown-4)yl = 1,4,7,10-tetraoxacyclododecyl) was utilised for the detn. of Na in various foodstuffs such as soup stocks, instant noodle stocks and milk powders. Good agreement was obtained between the proposed electrode and flame photometric methods. Also, the electrode exhibits min interference from K, Ca, Mg, Fe(III), Cu(II) and glucose, and from the synthetic colours tested. AS

1778

Barbera (R), Farre (R) and Lozano (A). **Determination of manganese in vegetal foods by atomic absorption spectrometry.** *Anales de Bromatologia* 42(1); 1990: 127-132 (Es)

A flame atomic absorption spectrometry method for Mn detn. in foods after acid decomposition of organic matter is reported. The results obtained with respect to linearity range (0, 2.7 µg/ml), detection and quantitation limits (24.12 and 60.49 ng/ml) respectively, precision (CV = 4.39%), and accuracy performed by recovery assays (100.42%), as well as the tests with a certified patron (Citrus Leaves NBS 1572) (certified value 23 ± 2 ng/g, found value 21.8 ± 0.2 ng/g) and the absence of interferences show that the method is useful for Mn detn. at the concn. usually present in vegetable foods. AS

Enzymes

1779

McKay (AM). **Production of extracellular β-glucosidase and α-galactosidase during fungal growth on polygalacturonate.** *Journal of Food Science* 56(6); 1991: 1749-1750

Filamentous fungi (*Aspergillus oryzae*, *Scopulariopsis* sp., and *Penicillium brevicompactum*) and yeast-like fungi (*Aureobasidium pullulans*) were induced to produce extracellular β-D-glucosidase (β-D-glucosidase glucohydrolase, EC 3.2.1.21) and α-D-galactosidase (α-D-galactoside galactohydrolase), EC 3.2.1.22, by polygalacturonate in the growth medium. These extracellular enzymes were not produced during growth of the microorganisms on cellobiose or melibiose. AS

1780

Sadhukhan (R), Roy (SK), Raha (SK), Manna (S) and Chakrabarty (SL). **Induction and regulation of α-amylase synthesis in a cellulolytic thermophilic fungus *Myceliophthora thermophila* D14 (ATCC 48104).** *Indian Journal of Experimental Biology* 30(6); 1992: 482-486

The effect of various carbohydrate sources on regulation of α-amylase produced by *Myceliophthora thermophila* D-14 grown in Czapek-Dox medium was studied. Results indicated that max. enzyme production was with 1% starch followed by a gradual decrease with increasing concn. α-Amylase synthesis decreased with the addition of glucose and the decrease was proportional to the concn. of glucose. The enzyme synthesis was resumed as the glucose concn. fell below the critical level. The addition of cAMP did not eliminate the repressive activity of glucose. Results suggest that extracellular α-amylase synthesis in *M. thermophila* D-14 was inducible and subject to catabolite repression. SRA

1781

Deshpande (MS), Bhat (SG), Thatte (JC), Kulkarni (MA) and Rale (VB). **Pigmentation and phenol oxidase during pullulan production by *Aureobasidium pullulans*.** *Indian Journal of Microbiology* 32(1); 1992: 95-97

Pullulan is a polysaccharide used as a low-calorie ingredient in foods. It is manufactured by fermentation of raw materials such as sucrose or

starch hydrolysates. *Aureobasidium pullulans* an yeast like fungus produces phenoloxidase and its relation to pigmentation during pullulan production is studied. Results indicate that the pigmentation in *A. pullulans* is associated with the phenoloxidase activity and with the use of nitrate in the growth medium. Pigmentation can be eliminated to get a colour free pullulan. GS

Fermented foods

1782

Lim (G). **Indigenous fermented foods in South East Asia.** *ASEAN Food Journal* 6(3); 1991; 83-101

This article briefly describes the various fermented foods produced by fungal action. Types of indigenous fermented foods (alcoholic beverages, foods, flavouring agents, miscellaneous), fungi used in fermentations (beer yeasts, rice wine fungi, toddy yeasts, tape fungi, tempeh fungi, oncom fungi, soy sauce fungi, Tau-si and tau-cheo fungi, Agn-kak fungi) and some problems of indigenous fermented foods are the aspects covered in this article. BV

Microorganisms

Bacteria

Lactococcus

1783

Al-Zoreky (N) and Sandline (WE). **Lactococcus genus: A selective and differential agar medium.** *Journal of Food Science* 56(6); 1991; 1729-1730, 1734

An agar medium (Alsan), was selective for *Lactococcus lactis* subsp. *lactis* and *Lactococcus lactis* subsp. *lactis* biovar. *diacetylactis*. The former developed white or yellow colonies; the latter gave blue-green or blue colonies. Eleven strains of *L. lactis* subsp. *cremoris* did not grow in this medium. The medium contained phenylethanol agar, lactose, glycine anhydride, lithium chloride and trimethoprim. In comparison with M17 medium, Alsan was not significantly different ($P > 0.05$) in recovering either bacterium. Furthermore, the medium inhibited the common food genera *Pseudomonas*, *Escherichia*, *Leuconostoc*, *Enterococcus* and *Lactobacillus*. Bacteriophage plaque sizes of 0.4 - 0.5 cm were demonstrated on the medium using a lactococcal bacteriophage. AS

Penicillium

1784

Matsuoka (H), Fuke (Y), Kaminogawa (S) and Yamauchi (K). **Purification and debittering effect of aminopeptidase II from *Penicillium casecolum*.** *Journal of Agricultural and Food Chemistry* 39(8); 1991; 1392-1395

An extracellular aminopeptidase II was purified by chromatographic techniques from *Penicillium casecolum*. The enzyme was most active at pH 8.0 and was stable over a wide pH range. The activity was inhibited by metal chelating agents and by 2-mercaptoethanol. The enzyme was remarkably activated by the addition of Co^{2+} . The mol. wt. of the enzyme was estimated to be 20 000 by Sephadex G-100, and the enzyme was the monomer when determined by SDS-PAGE. The enzyme has a wide specificity for various substrates, and it was capable of cleaving amino-terminal leucine and phenylalanine residues of dipeptides and oligopeptides. The effect of debittering for bitter peptide fraction from peptic casein was clearly found by APase II treatment for 3 h. AS

Salmonella typhimurium

1785

Sumner (SS), Sandros (TM), Harmon (MC), Scott (VN) and Bernard (DT). **Heat resistance of *Salmonella typhimurium* and *Listeria monocytogenes* in sucrose solutions of various water activities.** *Journal of Food Science* 56(6); 1991; 1741-1743

The heat resistance of *Salmonella typhimurium* was determined in sucrose sol. with a_w ranging from 0.98 - 0.83. The $D_{65.6\text{ C}}$ ranged from 0.29 - 40.2 min (> 100 -fold increase), with Z value 6.5 - 7.7 C. *S. typhimurium* was also heated in four chocolate syrups purchased at retail. The $D_{65.6\text{ C}}$ ranged from 1.2 - 3.2 min while the a_w of the syrups ranged for 0.75 - 0.84. The heat resistance of *Listeria monocytogenes* was determined in sucrose sol. with a_w ranging from 0.98 - 0.90. The $D_{65.6\text{ C}}$ value shifted from 0.36 - 0.38 min (10-fold increase); the Z value ranged from 7.6 - 12.9 C. AS

Fungi

Neosartorya fischeri

1786

Nielsen (PV). **Preservative and temperature effect on growth of three varieties of the heat-resistant mold, *Neosartorya fischeri*, as measured by an impedimetric method.** *Journal of Food Science* 56(6); 1991; 1735-1740

The combined effects of inoculum amount, temp. pH, and food preservatives on growth of three var. of heat-resistant mold *N. fischeri* cultured on a fruit juice-like medium was investigated. *N. fischeri* var. *glabra* growth occurred at 100 mg sodium benzoate/L at pH 3.5, a level that completely inhibited outgrowth of the other var. All were similarly affected by SO₂: completely inhibited by 300 mg/L at pH 3.5. The inhibitory effect of preservatives was strongly affected by pH, inoculum amount, and temp. Growth was significantly delayed when temp. was decreased from 32 to 25 to 18 C or pH from 4.5 to 3.5. This is the first report on the use of impedance microbiology to study the effects of environmental factors on molds. AS

Yeasts

1787

Fleet (G). **Spoilage yeasts.** *CRC Critical Reviews in Biotechnology* 12(1/2): 1992: 1-44

This review article covers the occurrence and growth of yeasts with respect to spoilage activities, the biochemistry of spoilage and technologies for enumeration and identification of spoilage in foods and beverages: fresh/processed red/poultry meat, seafoods, dairy products (milk, cream, butter, yoghurt, and cheese), fresh/processed fruits/vegetables, food with high sugar/salt, bakery products, alcoholic beverages (beer and wine), grains/grain silage and miscellaneous fermented products. 453 references. SD

1788

Sathe (S), Shivaraman (H) and Gokhale (DV). **Protoplast fusion in yeast: strain improvement in *Saccharomyces*.** *Indian Journal of Microbiology* 32(1): 1992: 15-27

Reviews the use of protoplast fusion techniques in the development of improved strains of *Saccharomyces* for brewing, wine making, baking and production of food. The technique is applicable to a wide range of bacteria, fungi, yeasts and algae. This technique allows the construction of industrially important strains containing new and unique fermentation and growth characteristics. 123 references. GS

BIOTECHNOLOGY

1789

Mariani (F). **Biocontamination, sources and vehicles in the food industry.** *Industria Alimentari* 30(296): 1991: 724-726 (It)

TISSUE CULTURE

Nil

FOOD ADDITIVES

Flavourings

1790

Burdock (GA), Pence (DH) and Ford (RA). **Safety evaluation of benzophenone.** *Food and Chemical Toxicology* 29(11): 1991: 741-750

Benzophenone (FEMA No. 2134; CAS No. 119-61-9) was administered in the diet to rats at target dose levels of 20 mg/kg body wt./day for 90 days and 100 or 500 mg/kg/day for 28 days. Body wt. and food consumption were measured weekly; haematology, clinical chemistry and urinalysis values were obtained at 4 wk and at the end of the study. Gross and microscopic pathological examinations were conducted and organ wt. were recorded. Treatment-related changes occurred in erythrocyte count, haemoglobin, haematocrit, bilirubin, total protein and albumin at the mid- and high-dose levels, although all changes did not occur in both groups in both sexes. There were indications of increased absolute and relative liver and kidney wt. in the mid- and high-dose groups, but this was not statistically consistent for absolute kidney wt. Histopathology of the liver in the mid- and high-dose groups showed hepatocellular enlargement with an associated clumping of cytoplasmic basophilic material around the central vein. A no-effect level was demonstrated at 20 mg/kg/day for 90 days of administration. This would be equivalent to an intake of 1200 mg/day for a 60-kg human. On the basis of the calculated Possible Average Daily Intake of 0.33 mg/day, a safety factor of > 3600 is demonstrated. The safety factor based on the more realistic *per capita* consumption of 0.32 µg/day would be approx. 3.7 million. AS

CEREALS

1791

Bailey (LN), Hauck (BW), Severson (ES) and Singer (RE). **Systems for manufacture of ready-to-eat breakfast cereals using twin-screw extrusion.** *Cereal Foods World* 36(10): 1991: 863-864, 866, 868-869

Describes how twin-screw extrusion cooking can be adapted to the manufacture of either flaked or direct-expanded ready-to-eat breakfast cereals. BV

1792

Burns (RE) and Fast (RB). **Design and operation of equipment for coating breakfast cereals.** *Cereal Foods World* 36(10); 1991; 879-887

The coating of breakfast cereals for either nutritional or flavouring purposes is discussed in terms of some of the equipment involved and of the effect of various coating formulations. BV

1793

Sinha (KK). **Prevention of aflatoxin production in some cereals and oilseeds by natural plant constituents.** *Irish Journal of Food Science and Technology* 14(2); 1990; 109-120

Phenolic compounds or the crude extracts of *Croton spersiflorum*, *Thysanolaena maxima*, *Myrtus communis*, *Lawsonia alba* and *Taxodium distichum* prevented aflatoxin production in cereals and oilseeds. At 0.01 M concn. on rice, caffeic and ferulic acids inhibited toxin elaboration by 60.8% and 55.9% respectively. Tannic acid caused most inhibition in wheat (58.33%) and maize (68.42%) and phloroglucinol in groundnut (70.53%) and mustard (57.14%). BV

Barleys

1794

Szczodrak (J) and Pomeranz (Y). **Starch and enzyme-resistant starch from high-amylose barley.** *Cereal Chemistry* 68(6); 1991; 589-596

A Glacier var. selection with a 43% amylose content was used for isolation and purification of barley starch. The starch was separated into two fractions that varied in granule size, and the two fractions were assayed using chemical, microscopic (scanning electron microscopy), and thermo-analytical methods. Large and small barley starch granules were different in both chemical composition and endothermic properties; the small starch granules were higher in amylose than the large granules. Heat-moisture treatment (autoclaving at 121 C) with subsequent cooling was used to produce amylase-resistant starch (RS) from purified high-amylose starch samples. The formation of RS in barley was strongly affected by the number of autoclaving-cooling cycles; increasing the number of cycles from one to 20 raised the RS yield from 6 to 26%. Differential scanning calorimetry thermograms showed that all isolated RS preparations exhibited an endothermic transition over a similar temp. range (116-177 C), with a mean peak temp. at 158 C, which could apparently be attributed to the melting of RS amylose crystallites.

The max melting enthalpy for RS from barley, 37 J/g, was achieved by 12 repeated autoclaving-cooling cycles. The thermodynamic data indicated that changes in the quality of RS occurred during autoclaving-cooling cycles. AS

Oats

1795

Rabault (J-L) and Downey (G). **Rapid analysis of oats for moisture and protein by near-infrared reflectance spectroscopy.** *Irish Journal of Food Science and Technology* 14(2); 1990; 85-93

Using a closed sample population, calibrations have been developed to predict moisture in coarsely ground oats (*Avena sativa*) (range 11.6 - 21.4%) and protein and moisture in finely ground oat grain (protein range 7.7 - 12.9%; moisture range 10.3 - 14.7%). NIR reflectance spectroscopy has been used for rapid analysis. GS

Oatmeals

1796

Jansson (KW) and Lindahl (L). **Rheological changes in oatmeal suspensions during heat treatment.** *Journal of Food Science* 56(6); 1991; 1685-1689

Two amylases from fungal and bacterial source were added to oatmeal suspensions in concn. varying from 0.0125 to 0.64%. Changes in viscosity, phase angle and elastic modulus during heating were followed together with sedimentation and flow properties. The complete pasting behaviour could be followed without sedimentation problems. The hydrocolloidal properties of β -glucans appeared to be important. The bacteria/enzyme reduced peak viscosity much more rapidly than the Fungamyl enzyme at low concn. The flow properties of a Fungamyl treated oat meal suspension with the peak viscosity reduced > 90% were pseudoplastic. AS

Rice

1797

Chandrasekhar (PR) and Chattopadhyay (PK). **Rice puffing in relation to its varietal characteristics and processing conditions.** *Journal of Food Process Engineering* 14(4); 1991; 261-277

The effect of rice varietal characteristics, namely, length (L); breadth (B), ratio, amylose and protein contents and processing conditions namely, extent/degree of hydrothermal treatment, degree of milling and percentage of salt addition to rice, on puffing quality were studied in detail. The L:B ratio

of var. tested showed a positive correlation ($r = 0.69$) with expansion ratio (ER) of puffed rice produced. Total amylose and hot water insoluble amylose contents revealed a definite pattern of relationship, with ER showing predicted peaks at 28.5% total amylose (db) and 13.5% insoluble amylose (db) for highest ER. Protein content showed a negative relationship ($r = -0.79$) with ER. A new method for determining extent/degree of starch gelatinization, based on Brabender hot paste peak viscosity value (viscosity of 15% slurry retained at 95 C for 20 min.) was used in this study. Normal parboiled and pressure parboiled rice having 425 BU and 240 BU peak viscosities produced highest ER of 7.5 and 9.7, respectively. A 6% milling (min) and a 2% salt ($\text{NaCl}/\text{CaCl}_2$) addition during preconditioning of rice resulted in max ER. AS

1798

Marshall (WE) and Normand (FL). Exothermic transitions in whole grain milled rice and milled rice flour studied by differential scanning calorimetry. *Cereal Chemistry* 68(6): 1991: 606-609

Cooling curves for long, medium, and short grain varieties and very low amylose var. of whole grain milled rice and their milled rice flours were generated by differential scanning calorimetry at a constant cooling rate of 1.0 C/min. Two successive heating and cooling cycles were run, but data were reported only for the two cooling cycles. Exothermic transitions were produced from all var., at least during the first cooling cycle. Exotherms were attributed to the crystallization of amylose-lipid complexes within the starch granule and were quantified by determining enthalpies (ΔH) for crystallization process. Exotherm formation during the first cooling cycle was influenced by the amount of rice lipid removed from the kernel or flour, the presence of intact kernel structure, and the amylose content of the rice. In most cases, exotherms were produced during the second cooling cycle and were smaller in magnitude than those originating from the first cooling. The degree of amylose-lipid complex formation during the second cooling was independent of rice lipid, kernel structure and amylose content. These exotherms appeared to depend only on the particular rice var. examined. AS

Rice bran

1799

Fellers (DA). Rice bran stabilization and recovery of edible oil-technical and financial feasibility. *Food Reviews International* 7(4): 1991: 445-483

The purpose of this paper is to consider and evaluate extruder cooker stabilization of rice bran in the overall process of producing edible rice bran oil. Alternate pathways in the production of refined, edible rice bran oil where in rice bran stabilization is part of the overall process are schematically presented. Other aspects covered are, potential for rice bran oil production, rice bran - the raw material, rice bran collection, stabilization, oil extraction, refining and bran to oil - financial feasibility. 52 references. SRA

Ryes

1800

Vinkx (CJA), Van Nieuwenhove (CG) and Delcour (JA). Physicochemical and functional properties of rye nonstarch polysaccharides. III. Oxidative gelation of a fraction containing water-soluble pentosans and proteins. *Cereal Chemistry* 68(6): 1991: 617-622

Pentosan-protein material from rye is subject to oxidative gelation. Thus, solutions of a fraction (obtained by precipitating water solubles from rye with ethanol) gel when solutions of hydrogen peroxide and horseradish peroxidase are added. The gelation reaction is inhibited by ferulic and vanillic acid but not by fumaric acid. This suggests that the mechanism whereby gelation occurs is comparable to that of wheat pentosan-protein material, in that the ferulic acid aromatic ring and not the propenoic moiety is involved in the gelation. Enzyme treatments showed that although protein probably is not necessary for the oxidative process, the presence of the pentosan moiety is required. Cysteine residues in the protein most likely are not involved in the gelation because N-ethyl-maleimide has no effect on gelation, and the inhibition of the gelation reaction by cysteine can be rationalized as an effect of competition for the hydrogen peroxide. Ascorbic acid also inhibited the gelation, and its role probably can be ascribed at least partially to the same mechanism. High concn. of cysteine or ascorbic acid in the presence of peroxidase and hydrogen peroxide reduced the relative viscosity of a pentosan-protein solution to experimental readings below those of the ungelled control solution. AS

Wheat

1801

Larsson (BK), Regner (S) and Baeling (P). Polycyclic aromatic hydrocarbon and volatile N-nitrosamine content of wheat grain before and after direct gas-fired drying. *Journal of the Science of Food and Agriculture* 56(3): 1991: 373-384

No differences in the level of polycyclic aromatic hydrocarbon (PAH) or detectable amounts of volatile N-nitrosamine were observed in the ingoing and outgoing samples, before or after drying. GS

1802

Boyacioglu (MH), Dick (JW) and D'Appolonia (BL). **A comparison of the Chopin-Dubois and modified Buhler durum wheat laboratory mills.** *Cereal Foods World* 36(10): 1991: 893-896

A Chopin-Dubois CD 2 mill, a durum wheat laboratory mill for producing semolina from durum wheat, was compared to a Buhler MLU 202 mill modified for milling durum wheat. Seventeen durum wheat cvs from California, North Dakota, Minnesota and Montana were milled in both mills. Semolina from both mills was purified similarly. Total extraction, semolina extraction, moisture, ash, protein, wet gluten, specks, and mixogram data were statistically analyzed. Semolina produced from the Chopin-Dubois CD 2 mill was significantly ($P = 0.05$) lower in percent moisture and speck count and higher in percent ash and mixogram score than that from the modified Buhler mill. AS

1803

Sosulski (FW), Lee (WJ) and Sokhansanj (S). **Wet milling and separation of wheat distillers' grains with solubles into dietary fiber and protein fractions.** *Cereal Chemistry* 68(6): 1991: 562-565

Wheat-based stillage from a fuel ethanol plant was wet milled by sonication, abrasive stone milling, and blade grinding before fractionation by sieving and centrifugation into distillers' grains (DG), centrifuged solids (CS), and thin stillage. Blade grinding was the most effective method for separating protein and fiber in stillage, with 40% of the fiber being concentrated in DG and over 70% of protein in CS. The DG, which contained over 70% of total dietary fiber, exhibited high water- and oil-absorption capacities and had potential as a fiber ingredient in foods. The CS fraction contained 60% protein and was lower in functionality than DG. Further studies are required to identify potential uses for the fractions and the economic feasibility of the process. AS

1804

Lukow (OM) and Mcvetty (PBE). **Effect of cultivar and environment on quality characteristics of spring wheat.** *Cereal Chemistry* 68(6): 1991: 597-601

The eight spring wheat cvs used in this study displayed a broad range in milling and baking quality. The best and poorest in overall breadmaking quality were represented by the cvs

Columbus and UM841, respectively. The semidwarf wheats Len and Norseman compared most favourably to Columbus and were also among the most environmentally stable cvs. Both cv and environment had a significant effect on quality parameters. Cv by environment effects were statistically significant but relatively small in magnitude for most parameters, as confirmed by the rank correlation results. Compositing samples over locations would be suitable for quality assessment for semidwarf wheats grown in Western Canada for most of the characteristics studied. For the quality parameters that displayed large cv by environment interactions (i.e. test wt. and thousand-kernel wt.), samples from several environments should be used for quality evaluation, particularly in advanced generation breeding lines. AS

1805

Grant (LA) and D'Appolonia (BL). **Effects of low-level gamma-radiation on water-soluble nonstarchy polysaccharides isolated from hard red spring wheat flour and bran.** *Cereal Chemistry* 68(6): 1991: 651-652

1806

Baguena (R), Soriano (MD), Martinez-Anaya (MA) and Benedito De Barber (C). **Viability and performance of pure yeast strains in frozen wheat dough.** *Journal of Food Science* 56(6): 1991: 1690-1694, 1698

Freezing and subsequent storage of wheat doughs containing *Saccharomyces cerevisiae*, *S. fructuum* or *Candida boldinii* after undergoing a bulk fermentation step, reduced the viability of yeasts, depending on the sp. Freezing and storage of doughs without bulk fermentation had no effect on viability. Gassing power was affected most by frozen storage, depending on storage time and sp. Changes in acidification capability were small, and only significant for total titratable acidity. Changes in sugars and leavening were closely related. Results showed that the use of less active yeast sp (*S. fructuum*), with high freezing tolerance in frozen dough processes would be of practical interest. AS

Wheat proteins

1807

El-Sakr (AS) and Mansour (SM). **Nutritive value of wheat germ proteins supplemented with lysine.** *Grasas y Aceites* 41(1): 1990: 52-58

Feedings experiments were carried out by using wheat germ supplemented with 0.24% lysine and wheat germ. The protein of different diets correspond to 10% of the gross energy value. Amino acids patterns for wheat germ showed that most of

the essential amino acids are present in optimal concn. The highest levels are achieved by leucine plus isoleucine and lysine. NPR, PER digestibility and NPV for wheat germ supplemented with lysine were lower values, compared with those given by wheat germ that were higher values. High significant differences for the PER values between the diets were found. AS

1808

He (H), Feng (GH) and Hosney (RC). **Differences between flours in the rate of wheat protein solubility.** *Cereal Chemistry* 68(6); 1991; 641-644

Extraction of flour with 1% sodium dodecyl sulphate (SDS), pH 7.0 showed that the proteins in poor-quality flour were solubilized at a faster rate than were those in good-quality flour, and the protein solubility of both flours increased with extraction time. When a sufficient extraction time was used, essentially all the flour proteins were solubilized. The relative viscosity of protein per milliliter of the protein solution from a strong flour was slightly higher (6%) than that of a similar extract from a weak flour. This indicates that the av. mol. wt. of the proteins in the strong flour was slightly larger. The relative viscosity per milligram of protein per milliliter of the protein solutions decreased with additional extraction time. A study of SDS-polyacrylamide gel electrophoresis and relative viscosity of unheated and heated protein samples showed that the decrease in viscosity was caused mainly by further dissociation of solubilized but still aggregated protein. AS

MILLETS

Corn

1809

Lee (WJ), Sosulski (FW) and Sokansanj (S). **Yield and composition of soluble and insoluble fractions from corn and wheat stillages.** *Cereal Chemistry* 68(6); 1991; 559-562

To assess their potential as sources of dietary fiber and protein ingredients, stillages were sampled from the beer stills of three commercial ethanol distilleries that were processing corn, wheat, or corn-wheat mashes. The distillers' grains with solubles (DGS) from wheat-based mashes contained more dietary fiber and protein and less lipid, than did corn-based DGS. Fractionation of the DGS into distillers' grains (DG) centrifuged solids (CS), and stillage solubles (SS) gave a partial separation of fiber into DG and protein into CS, but the yield of CS was too low for consideration as a commercial process. The wt. distributions of DG, CS and SS were approx. 42:2:56

wb and 75:5:20 db; further studies are required to effect a greater recovery of the CS fraction at a high protein level. AS

1810

Dorsey-Redding (C), Hurburgh (CRJr), Johnson (LA) and Fox (SR). **Relationships among maize quality factors.** *Cereal Chemistry* 68(6); 1991; 602-605

Maize properties believed to affect yield and quality of maize products were correlated. Samples of 183 genetically diverse maize hybrids grown in central Iowa in 1987 and 195 in 1988 were analyzed for protein, oil, starch, bulk density (test wt.), breakage susceptibility, kernel density, water absorptivity, hardness and average kernel wt. (1,000-grain wt.). Data were adjusted to 15.5% moisture basis. Hardness showed a significant correlation ($r > 0.6$) with protein, test wt. and kernel density. Oil was correlated ($r > 0.5$) with density and starch content and, to a lesser extent ($r > 0.4$), with test wt. and hardness. Prediction equations for hard-to-measure factors, hardness and density ($R^2 = 0.8, 0.7$), were developed from protein, oil, and test wt. The 1988 data were used to validate the 1987 results. The 1987 and 1988 correlation coeff. agreed in that they always had the same sign and were generally close in value. The 1987 and 1988 prediction equations also agreed in that the mean difference between predicted and actual values for both data sets were not significantly different ($P = 0.05$). AS

1811

Ning (L), Villota (R) and Artz (WE). **Modification of corn fiber through chemical treatments in combination with twin-screw extrusion.** *Cereal Chemistry* 68(6); 1991; 632-638

Corn fiber modification was achieved through acid, alkaline, and consecutive acid-alkaline treatments in combination with simultaneous thermal treatment. Twin-screw extrusion of the modified corn fiber was conducted to achieve additional fiber solubilization. A comparative study was performed on the functional properties of native and chemically modified corn fiber with and without extrusion. Soluble fiber content increased after chemical treatments alone or in combination with twin-screw extrusion. Consecutive acid-alkaline treatment most effectively increased the solubility of corn fiber. X-ray diffraction and scanning electron microscopy revealed altered fiber crystallinity and intermolecular structure after chemical and extrusion treatments. AS

Corn flour

1812

Gomez (MH), Waniska (RD) and Rooney (LW). **Starch characterization of nixtamalized corn flour.** *Cereal Chemistry* 68(6): 1991; 578-582.

Commercial nixtamalized corn flours used to prepare tortilla and tortilla chips were analyzed for particle size distribution, composition and functionality. Changes in starch crystallinity, solubility and kernel microstructure were evaluated in commercial samples of raw corn, alkaline-cooked and steeped corn (nixtamal), ground nixtamal (masa), and nixtamalized corn flour (NCF). The coarse, intermediate and fine particle size fractions of NCF had similar chemical composition and distribution of anatomical parts. Starch in the large particles of NCF was less damaged during grinding and was more soluble after autoclaving and sonication. Starch in the intermediate and smaller particle size fractions was more mechanically damaged, gelatinized and retrograded as indicated by decreased starch solubility (after autoclaving and sonication). NCF drying, the last thermal operation during processing, caused partial starch gelatinization and retrogradation, decreasing starch crystallinity. Thus, starch functionality was modified during NCF preparation, which negatively affected the rheological characteristics of rehydrated NCF; that is, it decreased the cohesiveness and plasticity of the NCF and the shelf-life of baked products, so that tortillas became stale sooner. AS

Corn meal

1813

Camire (ME) and Flint (SI). **Thermal processing effects on dietary fiber composition and hydration capacity in corn meal, oatmeal and potato peels.** *Cereal Chemistry* 68(6): 1991; 645-647

The effects of extrusion-cooking and baking on the dietary fiber composition and hydration capacity of corn meal, oatmeal and potato peels were compared. Total nonstarch polysaccharides increased in oatmeal and potato peels with both processes, but the ratio of soluble to insoluble nonstarch polysaccharides was higher in the extruded samples. Uronic acids were not affected by processing; Klason lignin decreased in potato peels only. Values for nonstarch polysaccharides generally increased when resistant starch was not removed by dispersion with dimethylsulphoxide prior to enzymatic digestion. Extrusion increased hydration capacity of corn meal and oatmeal; processed potato peels had lower hydration capacities than raw peels. AS

PULSES

1814

Kapoor (VP), Banerji (R) and Prakash (D). **Leguminous seeds: potential industrial sources for gum, fat and protein.** *Journal of Scientific and Industrial Research* 51(1): 1992; 1-22

The National Botanical Research Institute of Lucknow, India has carried out analysis of leguminosae family seeds collected from all over India for water soluble gums, moisture, protein, and pentosans. The tabulated results show that the seeds of the genera *Cassia*, *Crotalaria*, *Indigofera*, *Mellilotus* and *Sesbanta* are rich in gum contents, whereas all the sp. of *Acacia*, *Albizzia*, *Canavalia*, *Erythrina*, *Millettia*, *Tephrosia* and others were devoid of gum. In contrast, a few sp. of *Bauhinia*, *Caesalpinia*, *Desmodium* and some others contained appreciable amounts of gum but some sp. of the same genera were poor in gum. The part of the seed where gum is present in different seeds, is also indicated. Some potential sources of gums, which have been neglected, and some of which are cultivated and others are forest trees have also been given in tabular form. The fatty acid composition of oils from some under-utilized leguminous seeds are given; the oil content ranges from 0.2 to 30%. The crude protein of 161 leguminous seeds along with their amino acid content is also given which is useful in the utilization of seed meal. KAR

Chickpeas

1815

Batistuti (JP), Barros (RMC) and Areas (JAG). **Optimization of extrusion cooking process for chickpea (*Cicer arietinum* L.) defatted flour by response surface methodology.** *Journal of Food Science* 56(6): 1991; 1695-1698

Response surface methodology was employed to optimize the production of a snack food from chickpea. The independent variables process temp. (123 - 137 °C) and feed moisture (13 - 27% d.s.b.) were selected at five levels (rotatable five level composite design: - square root 2, -1, 0, 1, + square root 2) in the extrusion of defatted chickpea flour. Response variables were expansion ratio, shear strength of the extrudate and sensory preference assessed by an untrained panel. Expansion ratio increased steadily with decrease in feed moisture similar to cereal extrusion. Regions of maxima were observed for sensory preference and shear strength, and these two product attributes were linearly related. The most acceptable chickpea snack was rated higher than a commercial corn snack. AS

Cowpeas

1816

Okechukwu (PE), Rao (MA), Ngoddy (PO) and McWatters (KH). **Rheology of sol-gel thermal transition in cowpea flour and starch slurry.** *Journal of Food Science* 56(6): 1991: 1744-1748

A thermal scanning rigidity monitor was used to follow rheological changes during heating of cowpea flour and starch slurries. The gelatinization temp. of cowpea starch was in the range 67 - 78 C. For cowpea flour, in addition to starch gelatinization, a shallow plateau was observed. The starch gelatinization onset temp. shifted from 67 C for starch to 72 C for 25% cowpea flour that contained 12 - 15% starch. The modulus (G') of cowpea gels increased with flour concn. according to a power relationship. Rigidity of the cowpea starch and flour gels decreased at temp. higher than 78 and 87 C, respectively. AS

Faba beans

1817

Amarowicz (R), Shimoyamada (M) and Okubo (K). **Application of reversed phase liquid chromatography in the analysis of saponins in faba bean.** *Die Nahrung* 35(2): 1991: 217-219

Lentils

1818

Tang (J), Sokhansangj (S) and Sosulski (F). **Determination of the breakage susceptibility of lentil seeds.** *Cereal Chemistry* 68(6): 1991: 647-650

The Tangential Abrasive Dehulling Device and the Stein Breakage Tester were compared as methods for assessing the susceptibility of lentil seeds to breakage. Seed moisture content, operating time, and machine adjustments were the variables. Both devices were able to differentiate breakage susceptibility of lentil seeds at appropriate moisture levels under proper operating conditions. The Tangential Abrasive Dehulling Device required less operating time (2 min) and smaller samples, but the Stein Breakage Tester provided more consistent results at an operation time of 4 min. In general, breakage susceptibility of lentil seeds increased with decrease in moisture content and temp. AS

Mung beans

1819

Ajay Singh and Padmakar. **Effect of ultraviolet radiation on nutritional quality of mung bean (*Vigna radiata* L.) seeds.** *Die Nahrung* 35(2): 1991: 215-216

OILSEEDS AND NUTS

1820

Chandrasekara (MR). **Miltone: Present status and future prospects.** *Indian Food Industry* 10(1): 1991: 26-28

This article discusses the process of extraction of miltone, a vegetable-toned milk designed to meet the nutritional requirements of small children and other vulnerable sections of the population by the use of groundnut flour and soybean which had its own advantages. The use of soymilk in the preparation of miltone, properties of soy milk - miltone, equipments required for the production of soy milk - miltone and its advantages are the aspects covered. CSA

Coconuts

1821

Ogundiya (MO). **Glucose content of nut water in four varieties of coconut palm (*Cocos nucifera*).** *Journal of the Science of Food and Agriculture* 56(3): 1991: 399-402

A significant variation in the glucose content of coconut water of the four var. (Nigerian Tall (NT), Nigerian Dwarf Green (NDG), NT x NDG and Malayan Dwarf Yellow (MDY)) and a positive and significant association between the nut wt. and glucose level of both NT x NDG and MDY was observed. GS

1822

Gopalakrishnan (N) and Thomas (PP). **Some observations on the microwave exposure of coconut products.** *Indian Coconut Journal* 22(4): 1991: 13-14

Partially defatted coconut, coconut cake and milk removed coconut gratings were exposed to microwaves to examine the colour variation and aroma generation. The results showed that microwave heating contributes to the removal of off-flavour from coconut cake and also plays a role in the generation of roasted coconut aroma in coconut cake and partially defatted coconut gratings whereas no roasted aroma was obtained from milk removed coconut gratings. CSA

Groundnuts

Groundnut milk

1823

Lee (C) and Beuchat (LR). **Functional and sensory properties of salad dressing containing fermented peanut milk.** *Journal of Food Science* 56(6): 1991: 1664-1667, 1684

Incorporation of fermented peanut milk (substitute for buttermilk) into ranch-style salad dressings prepared from 3 commercial brands of mixes resulted in decreased lightness, creamy flavour, oil emulsion capacity and consistency. Changes were dependent upon the commercial brand of dressing mix. Fermented peanut milk can be substituted for buttermilk in salad dressing at levels upto 25% without substantial reduction in sensory qualities. BV

Groundnut proteins

1824

Rustom (IYS), Lopez-Leiva (MH) and Nair (BM). **Optimization of extraction of peanut proteins with water by response surface methodology.** *Journal of Food Science* 56(6): 1991: 1660-1663

Water extraction of peanut proteins was optimized to maximize protein extraction, Y_1 and protein concn. in the extract, Y_2 . A central composite design involving solids-to-water ratio (X_1), pH (X_2), temp. (X_3) and time (X_4) was used, and second-order models for Y_1 and Y_2 were employed to generate response surfaces. The optimum conditions to obtain Y_1 greater than or equal to 85% and Y_2 greater than or equal to 2.5% were $X_1 = 1:8$; $X_2 = 8.0$; $X_3 = 50$ C; $X_4 = 30$ min. Estimates of Y_1 and Y_2 at the optimum were 85.29% and 2.7%, respectively. Experimental verification gave values of $Y_1 = 84.39\%$ plus or minus 0.78 and $Y_2 = 2.80\%$ plus or minus 0.02. Y_1 and Y_2 were further maximized, as measured by absorbance of solution following centrifugation of the extract, when papain (0.05% g/g peanuts) was added and extraction was carried out at the optimum conditions. AS

Soybeans

1825

Che Man (YB), Wei (LS) and Nelson (AI). **Control of off-flavours of soybean extract by pH adjustment.** *ASEAN Food Journal* 6(3): 1991: 117-119

'Beany' and 'painty' off-flavours of soybean extract were eliminated by direct acid grinding at pH 3.0 - 3.8 using HCl, H_3PO_4 or tartaric acid. H_3PO_4 and

tartaric acid treated soybean extract were more acceptable while samples treated in HCl, showed salty taste which was quite objectionable. BV

Soy products

Tofu

1826

Champagne (CP), Aurouze (B) and Goulet (G). **Inhibition of undesirable gas production in tofu.** *Journal of Food Science* 56(6): 1991: 1600-1603

Pasteurization was effective in lowering the bacterial counts, and retarded gas production in tofu. The addition of lactic acid (reducing pH to 5.5) or lactic acid bacteria (2×10^7 CFU/g) to tofu reduced gas production by about 50%. Addition of both lactic acid and *Lactobacillus plantarum* stopped gas production in contaminated tofu. BV

1827

Sun (N) and Breene (WM). **Calcium sulphate concentration influence on yield and quality of tofu from five soybean varieties.** *Journal of Food Science* 56(6): 1991: 1604-1607, 1610

A mini-process is described for making tofu from 50-g quantities of soybeans. It was used to compare yield and quality among 5 Minnesota grown var. (Vinton, Corsoy, Hardin, Stine 2510, Stine 2810) and to determine optimum concn. of the coagulant, $CaSO_4$. Product yield (wet basis), solids recovery, protein recovery and textural quality (Texture Profile Analysis hardness and fracturability) were optimal at 0.02 N $CaSO_4$ for all 5 var. Negative correlations were found between $CaSO_4$ concn. and both yield ($r = -0.09$ to 1.00) and protein recovery ($r = -0.96$ to 1.00) for all var. AS

Soy proteins

1828

Sorgentini (DA), Wagner (JR), Arrese (EL) and Anon (MC). **Water imbibing capacity of soy protein isolates: Influence of protein denaturation.** *Journal of Agricultural and Food Chemistry* 39(8): 1991: 1386-1391

In the present work the influence of the degree of protein denaturation and aggregation on water imbibing capacity (WIC) was studied. The results obtained show that the insoluble fraction of all isolates contributed the most to the WIC of the total isolate. This insoluble fraction is constituted by denaturated 11S and 7S proteins and some native 7S protein. WIC values of insoluble and soluble

fractions are also influenced by the state of aggregation of their component proteins. AS

TUBERS AND VEGETABLES

Carrots

1829

Penner (MH) and Kim (S). **Nonstarch polysaccharide fractions of raw, processed and cooked carrots.** *Journal of Food Science* 56(6): 1991: 1593-1596, 1599

The total nonstarch polysaccharide (NSP) and soluble NSP components of raw, processed (canned and frozen) and home-cooked (boiled) Royal Chantenay carrots were analysed. Total NSP was composed of glucose (37%) and uronic acid (35%). Soluble NSP was composed of > 50% uronic acids. Processing and simulated home-cooking of raw carrots resulted in an increase in the amount of NSP/unit dry wt. Relative to raw carrots, cooking of canned product resulted in the largest (two fold) increase in total and soluble NSP/unit dry wt. Relative differences in NSP were not as great when compared on a wet wt. basis. AS

Cassava

1830

Obrein (GM), Taylor (AJ) and Poulter (NH). **Improved enzymic assay for cyanogens in fresh and processed cassava.** *Journal of the Science of Food and Agriculture* 56(3): 1991: 277-289

The assay for cassava cyanogens developed at the Natural Resources Institute has been modified to overcome some of the problems encountered when the assay is applied to cassava products. Inclusion of 25% ethanol in the extraction medium increased the volume of recovered extract from heat-processed cassava products, eliminated the need for centrifugation and did not interfere with any aspect of the assay. Greater cyanohydrin recovery was noted and the calculation for cyanogen contents was changed to take into account the total extract volume. The separate assay of the three cyanogens (glucosides, cyanohydrins and free cyanide) was achieved by buffering aliquots of the extract followed by appropriate treatment. The importance of assaying for free cyanide (HNC) at pH 4 was demonstrated. Above this pH, cyanohydrin degradation also produces free cyanide, giving rise to misleading values. The efficiency of the extraction medium in recovering added linamarin and cyanohydrin from cassava foods was determined. Recoveries of cyanohydrin were improved using the

ethanol/acid medium. The stability of the cyanogens in the ethanol/acid extraction medium was tested at ambient and refrigeration temp. Over a two-month period, refrigerated extracts showed acceptable variation as compared with normal variation within the assay (5%) for total and non-glycosidic cyanogens but the levels of free cyanide showed heavy losses (15-56% loss). Since the relative toxicities of the three cyanogens have yet to be ascertained, the relative amount of each cyanogen may be important when assessing the safety of cassava products. AS

Garlic

1831

Agrawal (R), Mohanty (B), Singh (NS) and Patwardhan (MV). **Parameters affecting allicin formation as a secondary metabolite by static cultures of *Allium sativum*.** *Journal of the Science of Food and Agriculture* 57(2): 1991: 155-162

Garlic (*Allium sativum* L) bulb explants produced undifferentiated white globular callus when grown on MS medium having 2,4-dichlorophenoxyacetic acid (2,4-D) and Kinetin (Kn). Such callus when grown on medium having indole-3-yl-acetic acid (IAA) and/or Kn developed into the differentiating callus which had comparatively more allicin than that of undifferentiated callus. The effect of sucrose, NH_4^+ NO_3^- ratios and hormone concn. on growth and allicin development in the callus was investigated. There was a significant increase in allicin development in callus when grown for up to 4 wks on medium (a) having sucrose at 3% and 5% levels; (b) having NH_4^+ and NO_3^- ratios at 2:1 and 1:1 and (c) with Kn alone at a concn of 0.5 mg l^{-1} , which produced a tenfold increase in allicin content. AS

Potatoes

1832

Barichello (V), Yada (RY) and Coffin (RH). **Starch properties of various potato (*Solanum tuberosum* L) cultivars susceptible and resistant to low-temperature sweetening.** *Journal of the Science of Food and Agriculture* 56(3): 1991: 385-397

Differential scanning calorimetry (DSC) showed an increase in resistance to gelatinisation of isolated starch granules which correlated ($r = 0.911$) with higher chip scores following potato storage at 4 C and 12 C. The result indicate that the starch properties play a major role in low temp. sweetening of potatoes. Therefore, DSC allows early detection of cvs which could be 'non-chippers' following 4 C and/or 12 C storage. This technique may also be used in assessing different lots of potatoes of the

same var. to determine which, after storage, are most likely to produce acceptably coloured chips. GS

1833

Biswal (RN) and Bozorgmehr (K). **Equilibrium data for osmotic concentration of potato in NaCl-water solution.** *Journal of Food Process Engineering* 14(4); 1991; 237-245

Equilibrium data needed in modelling of osmotic dehydration are reported for unblanched diced potato in contact with aqueous solutions of NaCl. Diced potato, 1 cm cubes, were equilibrated with 0 - 12% (w/w) aqueous NaCl sol. at 3 temp. (8, 21 and 35 C). The mass fraction of total solids nonsalt (w^0_3) in potato at equilibrium was modeled as a function of mass fraction of total solids in the fresh material at full turgor (w^F_3), concn. of NaCl in the external solution (w_m) and temp. Using w^0_3 and w_m , and assuming that the activity of NaCl in the potato tissue and the external solution at equilibrium are equal, equilibrium densities were calculated based on the principle of volume additivity. The predicted and experimentally measured equilibrium densities were in close agreement. AS

1834

Ruan (R), Schmidt (SJ), Schmidt (AR) and Litchfield (JB). **Nondestructive measurement of transient moisture profiles and the moisture diffusion coefficient in a potato during drying and absorption by NMR imaging.** *Journal of Food Process Engineering* 14(4); 1991; 297-313

A nondestructive method to measure the internal moisture distribution and to determine the effective moisture diffusion coefficient for a potato during drying and absorption was developed using NMR imaging and numerical modeling techniques. The coefficients obtained were 1.04 to $7.28 \times 10^{-10} \text{ m}^2/\text{s}$, for moisture contents between 40% and 55% (wb), during drying with a sample temp. of 40 C; and were 9.78×10^{-12} to $2.33 \times 10^{-11} \text{ m}^2/\text{s}$, for moisture contents between 56% and 60%, during absorption at 23 C. AS

1835

Bohac (JR). **A modified method to purify patatin from potato tubers.** *Journal of Agricultural and Food Chemistry* 39(8); 1991; 1411-1415

Patatin is a major potato tuber storage protein of approx. 40 kDa that exhibits esterase activity. A purification protocol was developed which involved the following: precipitation of the crude enzyme from potato extracts in stepwise extraction with 40 - 70% ammonium sulphate followed by chromatography of the most active fractions on Bio-Gel P-100 and of

salt gradient fractions on DEAE-Sephacel and Con A-Sepharose. p-Nitrophenyl acetate (PNP acetate) and PNP laurate were used to determine the specific activity after each purification step. Enzymatic rates were linear during the assays and were much higher when PNP laurate was used as a substrate. Assay results revealed a 21-fold increase in specific activity of patatin from the crude extract compared to the extract from the Con A column. Preparative SDS-PAGE of the final extract revealed the low mol. wt. bands had been eliminated from Con A fraction. AS

Sweet potatoes

Sweet potato starch

1836

Kohyama (K) and Nishinari (K). **Effect of soluble sugars on gelatinization and retrogradation of sweet potato starch.** *Journal of Agricultural and Food Chemistry* 39(8); 1991; 1406-1410

The effect of water-soluble sugars contained in sweet potato on gelatinization and retrogradation of starch was studied by means of differential scanning calorimetry. Gelatinization peak temp. T_p and gelatinization enthalpy increased with increasing sugar concn. The shift of T_p to higher temp. was attributed to the stabilization of the crystalline region in starch and the immobilization of water by sugar molecules. The effect is larger in the order sucrose, glucose, fructose. All these sugars prevent retrogradation of sweet potato starch paste, and the order of effectiveness is the same as in the case of increase in gelatinization temp. The effect of sucrose concn. on T_p was explained by a zipper model approach. AS

Vegetables

1837

Bache (CA), Lisk (DJ) and Stoewsand (GS). **Cyclohexylamine residue in vegetables blanched with primary steam.** *Journal of Food Safety* 12(2); 1992; 161-166

Snap beans and green peppers blanched with steam containing cyclohexylamine (CHA) (a corrosion inhibitor for steam generation systems) showed presence of appreciable residues of CHA. The known toxicologic properties of CHA are reviewed and the need for further studies of possible food contamination or direct human exposure by other commonly used steam additives is emphasized. BV

1838

Diez (MJF). **Pickled fruits and vegetables. Grasas y Aceites** 42(1); 1991: 74-83 (Es)

Review. 26 references. BV

1839

Lee (YC). **Kimchi: The famous fermented vegetable product in Korea. Food Reviews International** 7(4); 1991: 399-415

This article reviews with emphasis on preparation of Kimchi (variety of Kimchi and taste of Kimchi), microorganisms involved in the fermentation, changes in the composition during ripening, methods to extend shelf-life and commercial production. 3 references. SRA

Brinjals

1840

Uday Kumar and Agarwal (HC). **Degradation of dithane M-45 residues in brinjals during cooking. Bulletin of Environmental Contamination and Toxicology** 47(5); 1991: 725-731

The amount of ethylene thiourea (ETU) in washed samples (brinjals) was 216.5 µg/g as compared to 1550 µg/g in case of unwashed samples. Cooking reduced the amount of ETU from 1550 µg to 342.9 µg/g in case of unwashed samples while in case of washed samples the amount of ETU decreased from 216.5 µg/g to 181.4 µg/g. BV

Brussels sprouts

1841

Bottcher (H). **Quality changes of brussels sprouts (*Brassica oleracea* L. gemmifera DC) during storage. Part. 1. External and sensory quality characteristics. Die Nahrung** 35(2); 1991: 169-178 (De)

During a test period of several years Brussels sprouts which have been stored without stems at 0 to +4 C revealed mainly linearly rising losses of fresh matter (at 0 C degressively) and by rotting (at 0 C progressively). The linear deterioration of the external quality is primarily expressed by yellowing of sprouts, occurring of rots on the stored sprouts and developing of bad smell. It is more drastic than the linear decrease of the sensory quality where flavour and odour are the decisive criteria. The influence of temp. was significant for all characteristics between the tested levels with the exception of the +4 C levels and outdoor-air ventilation (+0.5 ... +4 C). The annual growth and

variety conditions come second in their effect on the storage result. In case of Brussels sprouts it is highly necessary that the material is quickly cooled down to temp. of less than or equal to 0 C immediately after harvesting. The shelf-life in dependence on temp. follows an exponential course according to the model function $y = \beta_1 e^{-c\theta}$ (θ = storage temp. in C, c = dimension figure for the speed of storability decrease). AS

1842

Bottcher (H). **Quality changes of brussels sprouts (*Brassica oleracea* L. gemmifera DC) during storage. Part 2. Nutritional quality. Die Nahrung** 35(2); 1991: 179-191 (De)

During several years of testing under the conditions of mechanical cooling (0 C and +4 C) and outdoor-air-ventilation (+0.5 ... 4 C) the effect of the storage period (x in storage days) on the shelf-life of Brussels sprouts stored without stems was studied. The respiration dynamic causes a linear decrease of the dry matter content and a mostly linear increase of dry matter losses in the product. The typical losses of vitamin C (ascorbic acid + dehydroascorbic acid) and total carotene rise linearly at lower temp., at +4 C however, they increase progressively ($y = \beta_1 x^2$). The share of dehydroascorbic acid in the total amount decreases slightly with the increase of storage time. Whereas monoglycerides show a typical transitory increase under the conditions ($y = \alpha + \beta_1 x - \beta_2 x^2$), disaccharides decrease retardantly at 0 C ($y = \alpha - \beta_1 x^3$) and linearly at higher temp. The content of titratable total acid rises linearly up to a level of 6.62 mmol/100g FM (= +23%). The great sensitiveness of Brussels sprouts to temp. is demonstrated by the significant gradations of the regression coeff. for changes from 0 to +4 C. This, however, does not generally refer to outdoor-air ventilation. Above that saccharides show a strong response to the annual growth conditions. Physiological relationships are discussed. AS

Leafy vegetables

Amaranthus

1843

Vargas-Lopez (JM), Paredes-Lopez (O) and Ramirez-Wong (B). **Physicochemical properties of extrusion-cooked amaranth under alkaline conditions. Cereal Chemistry** 69(6); 1991: 610-613

A Brabender extruder was used to study the effect of processing variables on the water absorption index (WAI), water solubility index (WSI), and masa hardness of alkaline-extruded amaranth flour. Extrusion variables studied were barrel temp. (50, 60 and 70 C), feed moisture content (20, 25 and 30%)

and screw speed (30, 45 and 60 r.p.m.). Regression analysis showed that changes in all response variables for amaranth flour were promoted by barrel temp. and feed moisture content. Screw speed in the evaluated range was significant for masa hardness. Polynomial equations obtained for each physicochemical property accounted for 86-93% of the total variation. In general, WAI values increased when the barrel temp. and feed moisture content were increased. WSI values decreased with increasing barrel temp. and feed moisture content. Higher masa hardness values were found at extreme values of barrel temp. and feed moisture content, whereas increasing moisture content and screw speed resulted in lower masa hardness values. Extrusion-cooked amaranth flour under alkaline conditions may be used for preparation of tortillas and tortilla-based products. AS

Cabbages

1844

Paakkonen (K) and Plit (L). **Equilibrium water content and the state of water in dehydrated white cabbage.** *Journal of Food Science* 56(6); 1991: 1597-1599

Lettuce

1845

Barriga (MI), Trachy (G), Willemot (C) and Simard (RE). **Microbial changes in shredded iceberg lettuce stored under controlled atmospheres.** *Journal of Food Science* 56(6); 1991: 1586-1588, 1599

Initial microbial populations in shredded Iceberg lettuce (*Lactuca sativa* L.) cv 'Great Lakes', were determined and their changes under different controlled atmospheres were studied. Lettuce was shredded, washed, disinfected, water rinsed and centrifuged before being stored for 12 days under air, 3% O₂, 3% O₂ + 5% CO₂ or 3% O₂ + 10% CO₂. Microbiological analysis and assessment of visual quality were carried out every 3 days. No human pathogens were found. Controlled atmospheres had little or no effect on the microbiological populations studied. A 3% O₂ + 10% CO₂ atmosphere maintained acceptable visual quality of lettuce, without appreciably affecting microbial development. AS

Tomatoes

1846

Dujaili (JA) and Anderson (RE). **Aciduric, pH-elevating *Bacillus* which cause noneffervescent spoilage of underprocessed**

tomatoes. *Journal of Food Science* 56(6); 1991: 1611-1613

FRUITS

1847

Saxena (J) and Mehrotra (BS). **The occurrence of mycotoxins in some dry fruits retail marketed in Nainital district of India.** *Acta Alimentaria* 19(3); 1990: 221-224

Ten samples of marketed dry fruits were screened for various mycotoxins (aflatoxins, rubratoxin, ochratoxin A, citrinin, zearalenone and sterigmatocystin). It was found that percentage contamination by mycotoxins was highest in coconut (55.6%) and lowest in date palm (16.7%). Of all mycotoxins, aflatoxins were more common than others and in most of the samples the amount was found to be higher than the permissible limit for human consumption. However, the frequency of occurrence of other mycotoxins was considerably lower. AS

1848

Tantchev (SS), Malkki (Y), Pessa (E), Kinnunen (A) and Morkkila (M). **An absorption weighing method for determining the degree of enzymatic maceration in fruit and vegetables.** *Acta Alimentaria* 19(3); 1990: 261-271

1849

Watada (AE), Abe (K) and Yamuchi (N). **Physiological activities of partially processed fruits and vegetables.** *Food Technology* 44(5); 1990: 116, 118, 120-122

This article discusses the changes that takes place in the fruits and vegetables during the harvest stage, the injuries and wounds caused by the physical actions of partial processing, the textural changes, absorption of ethylene and loss of pigments which affect the physiological activities and subsequently the quality of produce. CSA

1850

Dougherty (RH). **Future prospects for processed fruit and vegetable products.** *Food Technology* 44(5); 1990: 124, 126

Various factors that must be considered for the future of processed fruits and vegetables such as demographics, consumer attitudes, processing and packaging, food distribution systems, raw materials for processing, environmental issues and globalization are discussed. CSA

1851

Zhang (SQ) and Matsuura (T). **Recovery and concentration of flavour compounds in apple essence by pervaporation.** *Journal of Food Process Engineering* 14(4): 1991: 291-296

Recovery and concn. of flavour compounds from an apple essence (x500) was attempted by pervaporation using a silicone rubber (polydimethylsiloxane) membrane at room temp. The flavour components were identified by GC-MS method, and the ratio of concn. of the flavour compound in the permeate to that in the feed was determined for each component. It was found that pervaporation is indeed an effective measure for the above purpose. Concn. ratios above 20 were achieved for flavour components with boiling points lower than 100 C. AS

1852

Scow (CC), Tan (SC) and Lim (SJ). **Production of firmer-textured canned and frozen tropical fruit and vegetables.** *ASEAN Food Journal* 6(3): 1991: 104-108

The effect of low temp. - long time blanching and conventional high temp. blanching on the canned and frozen tropical fruits (guava and papaya) and vegetables (celery, okra, winged beans, carrots and green beans) is studied. The optimum temp. for low-temp. (LTLT) blanching was found to vary with the type of material, ranging from 50 C for the fruits and 70 C for vegetables (bitter gourd). Addition of Ca to blanch water in LTLT blanching produced significantly firmer ($P < 0.01$) frozen carrots and green beans and had no significant effect ($P < 0.05$) on the firmness of frozen celery. Statistical analysis also showed no significant differences ($P < 0.05$) in drip loss between blanching treatments. SRA

1853

Abe (K) and Watada (AE). **Ethylene absorbent to maintain quality of lightly processed fruits and vegetables.** *Journal of Food Science* 56(6): 1991: 1589-1592

Ethylene had an undesirable effect on the quality of kiwifruits, bananas, broccoli, and spinach leaves that were prepared and stored as lightly processed products. A 2 or 20 p.p.m. ethylene treatment hastened the softening of the pulp of kiwifruits and bananas held at 20 C. Use of charcoal with palladium chloride, as ethylene absorbent, prevented the accumulation of the ethylene and was effective in reducing the rate of softening in kiwifruits and bananas and of chlorophyll loss in spinach leaves, but not in broccoli. AS

1854

Wiseman (JJ) and McDaniel (MR). **Modification of fruit flavours by aspartame and sucrose.** *Journal of Food Science* 56(6): 1991: 1668-1670

Power functions for fruitiness intensity of fruit flavoured (orange and strawberry) solutions unsweetened and sweetened with equal sweet concn. of aspartame and sucrose were developed using nine experienced panel members to assess any modification of fruit flavour by sweeteners. Enhancement (at low flavour levels) of fruitiness was observed in the aspartame sweetened systems even though the power functions of both flavorants were lowered by the addition of aspartame. The enhancement was more pronounced in the orange flavoured system, suggesting a flavorant effect. AS

Breadfruits

1855

Bates (RP), graham (HD), Matthews (RF) and Clos (LR). **Breadfruit chips: Preparation, stability and acceptability.** *Journal of Food Science* 56(6): 1991: 1608-1610

A chip-type snack from breadfruit similar to potato, plantain, corn or cassava chips is reported in this paper. Mature breadfruit, sliced to 1.25 mm, fried in soybean oil at 165 C and salted to 1.5% produced a stable, crisp chip with lipid stability comparable to potato chips. Partial air-drying prior to frying reduced oil absorption from 42 to 26%. The product was acceptable similar to plantain or potato chips. In view of the extreme perishability and high postharvest losses of breadfruit, chip production represents a useful value-adding preservation method and alternative for this underutilized food resource. BV

Mangoes

1856

Chaplin (GR), McBride (RL), Aminah Abdullah and Nuevo (PA). **Sensory and physico-chemical quality of 'Kensington' mangoes after storage at low temperature.** *ASEAN Food Journal* 6(3): 1991: 109-113

Sensory panel found that external appearance, flesh colour, aroma, sweetness and general acceptability declined to unacceptable levels when fruits were stored for longer than 2 or 3 wks at 5 C and one wk at 1 C. Low temp. storage increased acid content and decreased sweetness of mangoes. No commercial value was observed for constant temp. storage of mangoes at temp. lower than 10 C. SRA

Strawberries

1857

Ghaouth (AE), Arul (J), Ponnampalam (R) and Boulet (M). **Chitosan coating effect on storability and quality of fresh strawberries.** *Journal of Food Science* 56(6); 1991: 1618-1620, 1631

The effect of chitosan coating (1.0 and 1.5% w/v) in controlling decay of strawberries at 13 C was investigated as compared to a fungicide, iprodione (Rovral). Chitosan coating significantly reduced a decay of berries (P less than or equal to 0.05) compared to the control. There was no significant difference between chitosan and fungicide treatments up to 21 days storage. Thereafter, Rovral-treated berries decayed at a higher rate than chitosan-coated berries. Chitosan-coated berries stored at 4 C were firmer, higher in titratable acidity, and synthesized anthocyanin at a slower rate than Rovral-treated or nontreated berries. Chitosan coating decreased respiration rate of the berries with a greater effect at higher concn. AS

1858

Guichard (E), Issanchou (S), Descourvieres (A) and Etievant (P). **Pectin concentration, molecular weight and degree of esterification: Influence on volatile composition and sensory characteristics of strawberry jam.** *Journal of Food Science* 56(6); 1991: 1621-1627

Composition of headspace, consistency, taste and flavour characteristics were determined in jams made with different pectins. At usual concn., high methoxylated pectin induced an undesirable modification of typical flavour and intensity of flavour and taste, whereas low methoxylated pectin induced few alterations. At fixed concn. and mol. wt., a decrease in degree of esterification produced a significant decrease in consistency and noticeable modifications of the flavour perception and headspace composition, but no taste alteration. Mechanical reduction of pectin mol. wt. significantly modified only the consistency. AS

CONFECTIONERY, STARCH AND SUGAR

1859

Roos (Y) and Karel (M). **Water and molecular weight effects on glass transitions in amorphous carbohydrates and carbohydrates solutions.** *Journal of Food Science* 56(6); 1991: 1676-1681

The effects of water, freeze-concn. and effective mol. wt. (M_e) on glass transition (T_g) of maltose and maltodextrins were studied, and methods to predict

T_g were used to establish state diagrams. T_g of maximally freeze-concentrated solutes (T_g) and onset of ice melting (T_m) increased with M_e , and for high mol. wt. polysaccharides T_g and T_m were predicted to have the same temp. value. Ice formation at $T_g < T < T_m$ was time dependent. Unfrozen water in maximally freeze-conc. matrices was about 20% independently of M_e . The state diagrams can be used to evaluate physical state of frozen and dehydrated foods. AS

Confectionery

Chocolates

1860

Hurrell (RF), Reddy (MB), Dassenko (SA), Cook (JD) and Shepherd (D). **Ferrous fumarate fortification of chocolate drink powder.** *British Journal of Nutrition* 65(2); 1991: 271-283

The usefulness of ferrous fumarate as an iron fortificant for an experimental chocolate drink powder targetted to children and adolescents is evaluated in this study. The study showed that chocolate drink powders fortified with ferric pyrophosphate and reconstituted with cold, hot (80°) and boiling water or milk were acceptable with respect to colour and taste. The ferrous fumarate fortified products reconstituted in similar conditions, changed colour from red/brown to an unacceptable grey. When the Fe compounds were added to chocolate drink before consumption, the adsorption of ferrous fumarate was 3.31%, ferrous sulphate was 2.82% and ferric pyrophosphate was 2.11%. Whereas the absorption of ferrous fumarate was 5.27%, ferrous sulphate 2.62% and ferric pyrophosphate 0.55%, when the Fe compounds were processed during the manufacture of chocolate drinking powder. This study suggests that in the absence of food, one glass of chocolate milk drink will furnish approx. 0.5 mg absorbable Fe serving. Two glasses/day, would cover a substantial part of Fe requirement. SRA

Sugar

Jaggery

1861

Patil (JP) and Shingte (AK). **Effect of application of phosphorus and potassium to sugarcane crop and its effect on quality of jaggery. Part II.** *Indian Sugar* 42(1); 1992: 13-18

Experiments were conducted at the College of Agriculture, Kolhapur (Maharashtra) in the year 1982-83 and 1983-84 using Co 740 sugarcane var.

In factorial block design with 3 replications using 4 levels each of P_2O_5 (0, 55, 110 and 165 Kg/ha) and K_2O (0, 55, 110 and 165 Kg/ha). The cane was analysed at 10 and 11 months age and at harvest. Application of P_2O_5 in all the 4 levels did not affect the ash content, pH, lead number, purity coeff. and net rendement of jaggery significantly at 10, 11 months and at harvest during both the yr. Application of K_2O at 165 Kg/ha gave higher ash content, purity coeff. and net rendements of jaggery in both seasons at 11 months and at harvest. SRA

BAKERY PRODUCTS

Bread

1862

Kou (Y) and Chinachoti (P). **Structural damage in bread staling as detected by recoverable work stress-strain model analysis.** *Cereal Foods World* 36(10): 1991: 888-892

Recoverable work and stress-strain relationship of bread crumb were studied during storage. A typical stress-strain sigmoidal curve for solid foams was observed. Nonlinear curve-fitting analysis gave three constants, C_1 , C_2 and C_3 , which changed over a storage period. During 8 days of storage, C_1 increased 4 times, C_2 decreased one half, and C_3 decreased only slightly. Bread that had been precompressed (compacted up to 50% gave a stress-strain curve with a decreased C_1 , in C_3 as compared with an uncompacted bread. This was due to the damage of the cellular structure and an increase in relative density due to the precompaction. The percent recoverable work decreased significantly with an increased degree of deformation and storage time. The recoverable work increased curvilinearly with moisture content and rh, depending on the degree of deformation. AS

1863

Addo (K) and Pomeranz (Y). **Lipid binding and fatty acid distribution in flour, dough and baked and steamed bread.** *Cereal Chemistry* 68(6): 1991: 570-572

Lipid binding and fatty acid distribution were determined in flour, mixed dough and crumb of baked or steamed bread. Dough mixing, baking and steaming of the original flours reduced extractability of free (petroleum-ether extractable) flour lipids. No significant difference was found in the extent of lipid binding in native flour as a result of baking and steaming. In experiments with untreated flour, shortening lipids were bound during baking or steaming but not during dough mixing. In experiments with petroleum-ether defatted flour,

shortening lipids were also bound in the dough. Flour lipids were bound in preference to shortening lipids. Protein content was apparently not the only factor associated with degree of lipid binding. More unsaturated oils than saturated fats became bound during dough mixing and baking. In untreated flour supplemented with 2% shortening, baking and steaming resulted in more binding of saturated fats and unsaturated oils than dough mixing did. In defatted flour, the binding of unsaturated oils increased in order of dough mixing, baking and steaming. In general, steaming resulted in more shortening binding than baking did. AS

1864

Zanoni (B), Smaldone (D) and Schiraldi (A). **Starch gelatinization in chemically leavened bread baking.** *Journal of Food Science* 56(6): 1991: 1702-1706

Differential scanning calorimetry was employed to assess the kinetics of the starch gelatinization in bread doughs. The process of gelatinization, which depended on the depth from the surface of the sample, followed the same first order kinetics in the baking treatment and in the calorimetric scan. Its progress was predictable when the local temp. could be suitably recorded. Accordingly, thorough temp. control allowed monitoring starch gelatinization and bread baking. AS

Cookies

1865

Gonzalez-Galan (A), Wang (SH), Sgarbieri (VC) and Moraes (MAC). **Sensory and nutritional properties of cookies based on wheat-rice-soybean flours baked in a microwave oven.** *Journal of Food Science* 56(6): 1991: 1699-1701, 1706

Cookies prepared with a blended flour of 50% wheat, 40% brown rice and 10% defatted soy flours or 35% broken rice and 15% defatted soy flours, baked in a microwave oven (2450 MHz) for 240 s were rated as the best of 6 formulas to produce cookies with good sensory properties, acceptability and adequate nutritive quality. BV

Dough

1866

Inoue (Y) and Bushuk (W). **Studies on frozen doughs. I. Effects of frozen storage and freeze-thaw cycles on baking and rheological properties.** *Cereal Chemistry* 68(6): 1991: 627-631

The effects of frozen storage for one wk and of freeze-thaw cycles during the storage period on

rheological and baking properties of yeasted dough were studied. Two oxidant additions (ascorbic acid without and with potassium bromate) were used. A modified extensigraph procedure was used to measure the stretching properties of fermented doughs. Extensigraph resistance of thawed doughs decreased significantly after frozen storage for one wk and with an increasing number of freeze-thaw cycles. A highly significant positive correlation was obtained between loaf volume and max extensigraph resistance ($r = 0.935 - 0.976$, $P < 0.05$), and a highly significant negative correlation was obtained between final proof time to a fixed height and max resistance ($r = -0.969 - -0.987$, $P < 0.05$). A combination of ascorbic acid and potassium bromate, compared with ascorbic acid alone, strengthened the doughs and improved the baking potential of frozen dough. This result indicated that freeze damage to dough was dependent on the strength of the original dough. On the other hand, extensigraph resistance of nonyeasted doughs did not change after the first freeze-thaw cycle but decreased incrementally after the second and third cycles. Comparison of the extensigraph results for yeasted and nonyeasted doughs suggests that the gluten structure of yeasted doughs may be more vulnerable to the effect of freezing (e.g., ice crystallization) than that of nonyeasted doughs. AS

1867

Lorimer (NL), Zabik (ME), Harte (JB), Stachiw (NC) and Uebersax (MA). **Navy bean flour fractions in composite doughs: Effect of bean grade on rheology parameters and microstructure of wheat dough.** *Cereal Chemistry* 68(6): 1991: 636-641

To increase the economic feasibility of producing dry-roasted, air-classified legume flour fractions for use in composite flours, the effect of using prime and cull navy beans to produce high protein flours (fines) and cotyledon flours was investigated. These flours were used to produce wheat flour-bean composite doughs (at ratios of 95:5 and 90:10) for farinograph and low-temp. scanning electron microscopic microstructural evaluation. Composite flours with increased protein exhibited the expected increase in absorption, delay in arrival and peak time, and reduction in stability. An exception to this was the composite flour containing 5% prime navy bean fines. The stabilities of composites containing high protein fines were greater than those containing cotyledon flour. Bean grade produced few significant differences in farinograph parameters. For composites with 10% cull fines, absorption was higher, whereas arrival and peak times were significantly shorter. Microstructures of wheat-bean flour blend evaluations differed from those of the control (100% wheat flour) for all variables. No differences in farinograph parameters

due to bean grade were found for any composites containing cotyledon flour. The microstructure of composites with cotyledon flour from cull beans showed slightly greater gluten disruption than was evident in the doughs from the wheat-prime cotyledon composites. AS

Pasta

1868

Riva (M), Piazza (L) and Schiraldi (A). **Starch gelatinization in pasta cooking: Differential flux calorimetry investigations.** *Cereal Chemistry* 68(6): 1991: 622-627

Pasta cooking conditions were simulated in a differential flux calorimeter. The profile of the endothermic starch gelatinization peak was observed to directly describe the process according to first-order kinetics. An early small exothermic effect was attributed to wetting. Isothermal calorimetry provides much more reliable results than do other traditional approaches, and it allows comparison among different kinds of pasta. This work gives a detailed presentation of the physical meaning underlying the calorimetric trace, which allows assessment of the gelatinization kinetics and simple thermodynamic treatment. AS

Tortillas

1869

Serna-Saldivar (SO), Rooney (LW) and Greene (LW). **Effect of lime treatment on the availability of calcium in diets of tortillas and beans: Rat growth and balance studies.** *Cereal Chemistry* 68(6): 1991: 565-570

Quality protein maize (QPM), regular corn, and sorghum were lime-cooked (with CaO) and processed into tortillas. Weanling rats were fed raw grain or tortilla-based diets supplemented with dry, cooked pinto beans and a Ca-free or Ca-rich mineral premix. Processing raw grains into tortillas increased the Ca content from 11 to 163 mg/100 g. The raw grain and tortillas from QPM contained 53% more lysine than did raw grains and tortillas from regular corn and sorghum. Rats consuming Ca-supplemented QPM products consumed more feed and gained more wt. but had feed conversion ratios similar to those of their counterparts fed regular corn and sorghum. Rats fed raw grains not supplemented with Ca consumed less feed, gained less wt., and had poorer feed conversion ratios than did their counterparts fed Ca-supplemented diets. The negative effect of the lack of Ca was more noticeable as the experiment progressed. The Ca from tortillas was highly available because rats fed tortilla apparently absorbed and retained more Ca

than did rats fed unsupplemented raw grains. Rats fed tortilla diets supplemented with Ca had the poorest apparent P absorption and retention values. AS

MILK AND DAIRY PRODUCTS

1870

Kapil (V), Dodeja (AK) and Sarma (SC). **Lactose manufacture from whey - Engineering solutions.** *Indian Food Industry* 9(2): 1990: 27-32

This article deals with the economic utilization of whey in the manufacture of lactose using scraped surface heat exchanger. Uses of lactose, the manufacturing process of lactose which involves deproteinization of whey, concn., crystallization; harvesting of lactose crystals and refining of lactose are also discussed. CSA

Milk

1871

Hagrass (AEA), Fayed (EO), Aly (AA) and El-Samragy (YA). **Growth characteristics of enterococci isolated from Laban Rayeb.** *Die Nahrung* 35(2): 1991: 209-213

Eleven strains of *Enterococcus* (*Streptococcus*) *faecalis* isolated from Laban Rayeb, a type of fermented milk, had been studied when grown in milk. *Enterococcus* (*Streptococcus*) *faecalis* strains 19 and 22 were the most active strains in the production of lactic acid, acetaldehyde and diacetyl. Both strains exhibited a high proteolytic activity besides a good clean flavour. Based on the obtained results, *Enterococcus* (*Streptococcus*) *faecalis* 19 and 22 could be used to bring about the lactic fermentation during the manufacture of some cultured dairy products. AS

1872

Bora (K), Singh (J) and Goyal (GK). **Changes in physico-chemical properties of goat milk due to boiling and simmering processes.** *Indian Journal of Animal Science* 60(1): 1991: 112-114

Simmering of goat milk increased the viscosity (21.66%), decreased the curd tension (36.03%). Titratable acidity increased by 6.5%. pH of goat milk decreased slightly due to boiling and simmering processes. No effect was observed on sp. gr. and fat content due to boiling or simmering processes. Total solids (0.13%) and thiobarbituric acid value increased due to simmering. Total reducing capacity of goat milk increased by 10.32 and 17.41% in respect of boiled and simmered samples. BV

1873

Singh (RG), Singh (K) and Ogra (JL). **Studies on the lactic acid cultures for the preparation of Dahl from goat milk.** *Indian Journal of Dairy Science* 44(10): 1991: 620-623

Dahl was prepared from the milk of different breeds of goat and starter cultures. Good dahl was made from the milk of Black Bengal followed by Jamunapari, Barbari and Beetal breeds of goats. The best starter cultures at one percent concn. for dahl making from the milk of Jamunapari and Black Bengal were *Streptococcus paraclitrovorus*, *S. lactis* and *Lactobacillus casei* for Beetal while for Barbari milk were *L. bulgaricus*, *S. citrovorus* and *L. acidophilus*. Boiling of goat milk (25% T.S.) gave better dahl than pasteurization treatment. However, increasing of total solids to 20% in raw milk also gave better dahl from the milk for all the breeds of goat. AS

1874

Alvarez De Felipe (AI), Melcon (B) and Zapico (J). **Structural changes in sweetened condensed milk during storage: An electron microscopy study.** *Journal of Dairy Research* 58(3): 1991: 337-344

This work aimed to relate changes in rheological behaviour with structural details of different sweetened condensed milk samples as well as to clarify the role of additives in delaying gelation. To study the process of gelation, rheological techniques were applied to fresh and stored condensed milk samples for times and at temp. known to favour gelation (45 days at 37 C). Electron microscopy techniques were used to relate the rheological changes with observed structural details. Examination by electron microscopy showed that micellar aggregation and association of casein micelles with fat globules increased during storage. The whey proteins appeared to play an important role in the thickening process. AS

Milk products

Cheese

1875

Cavalier-Salou (C) and Cheftel (JC). **Emulsifying salts influence on characteristics of cheese analogs from calcium caseinate.** *Journal of Food Science* 56(6): 1991: 1542-1547, 1551

Cheese analogs were prepared from calcium caseinate, butter oil and emulsifying sodium salts (ES). Increasing ES levels gave cheese analogs with higher pH, degree of casein dissociation and degree

of fat emulsification than the control without ES. Firmness of cheese analogs first increased, then decreased when the ES level was increased from 1 to 3%. Effects depended on the degree of polymerization of phosphate salts. Sodium citrate (> 1%) or Na_2HPO_4 (> 2%) made cheese analogs more able to melt upon reheating. Melting ability correlated with high pH, soft texture, high degree of casein dissociation and low degree of fat emulsification. AS

1876

Zorrilla (SE) and Rubiolo (AC). **Average NaCl concentration in cheese for different volume ratios of brine and solid during salting.** *Journal of Food Science* 56(6): 1991: 1548-1551

Fick's second law for unsteady-state, one-dimensional diffusion in solid media from a well stirred solution of limited volume was used to develop mathematical equations for modelling the mass transfer of NaCl in cheeses during salting. A computational method was employed to solve the equations and analyze the suitable conditions for salt penetration in finite cylindrical cheese. Various volume ratios of solution and solid were considered to determine the variation of NaCl concn. in cheeses. Experimental results were predicted by the proposed mathematical model with < 10% error. AS

Cheddar cheese

1877

Kanawjia (SK) and Singh (S). **Effect of *Lactobacillus casei* and protease (*Aspergillus oryzae*) on enhancement of flavour and biochemical changes in buffalo milk Cheddar cheese.** *Indian Journal of Dairy Science* 44(10): 1991: 639-642

Attempts were made to accelerate the ripening of Cheddar cheese from buffalo milk, *L. casei* and protease (*Aspergillus oryzae*). Cheese was made with 0.50% *L. casei* and 2% lactic culture. Protease, 0.005, 0.010 and 0.025% (w/w) of curd) was mixed with salt and then added to milled Cheddar curd. The flavour development and biochemical changes in experimental cheese were faster than that of control. Due to synergistic effect of *L. casei* and protease quite as acceptable quality cheese could be obtained within 6 months of curing. AS

Ghee

1878

Sree Sree (P) and Lal (D). **Stability of butylated hydroxy toluene (BHT) and butylated hydroxy anisole (BHA) during clarification of butter into**

ghee and its subsequent storage. *Indian Journal of Animal Science* 60(1): 1991: 86-89

The effect of addition of BHT alone at 50, 100 and 200 p.p.m., and also that of BHT and BHA in 1:1 combination at 100 and 200 p.p.m. to butter on their stability during conversion into ghee and then during subsequent storage was studied. The stability of the antioxidants decreased during clarification of butter into ghee and also during its subsequent storage. Higher the concn. greater was the stability. The stability of BHT increased slightly in the presence of BHA. AS

Ice cream

1879

Zanotti (MR) and Pagani (M). **Methods of solid impurity determination in ice creams without added raw materials.** *Industria Alimentari* 30(289): 1991: 9-11, 14 (It)

1880

Bray (F). **Technology of fat-free ice cream.** *Industria Alimentari* 30(290): 1991: 117-119 (It)

This paper describes where on-line denaturation of mixture of whey and milk protein are obtained prior to further mixing of standard ice cream ingredients, followed by their final processing. The resulting protein-protein-water aggregations the fat structure and the final fat-free ice cream results with rheological features similar to the standard product which contains 8% fat. BV

Khoa

1881

Manisha Sapre and Deodhar (AD). **Effect of Khoa preparation from buffalo milk on protein quality.** *Indian Journal of Dairy Science* 44(10): 1991: 624-628

The changes in nutritional value of milk proteins on heat concn. of milk during khoa preparation was studied. Khoa was prepared from standardized buffalo milk (5% fat) by heating with super heated steam at 100-105 C and 1.406 kg/cm pressure. Samples were taken at initial (milk), intermediate (dhap) and final (khoa) stages for analysis. Proximate composition and lysine content were analysed by chemical methods. With progressive decrease in the moisture content from 87.9 plus or minus 0.31% to 35.6 plus or minus 0.63%, protein content increased from 4.1 plus or minus 0.12% to 19.8 plus or minus 0.12%; fat from 5.0 plus or minus 0.01% to 22.3 plus or minus 0.12%; and lactose from 4.4 plus or minus 0.05% to 21.0 plus

or minus 0.24%. The total lysine content in the final product was almost the same as in milk. In the biological evaluation using albino rats, small but significant increase in net protein utilization (NPU) and net protein ratio (NPR) was observed. It was concluded that nutritional value of milk proteins does not decrease during *khoa* preparation, and was an indication that the limiting amino acids were not heat affected. The increase in protein quality indices was attributed to the possible salutary effect of high lactose content in *dhap* and *khoa*, relative to standardized milk. AS

1882

Sawhney (IK), Patil (GR) and Kumar (B). **Effect of temperature on the moisture sorption isotherms of a heat-treated whole milk product, *khoa*.** *Journal of Dairy Research* 58(3); 1991; 329-335

Moisture sorption isotherms of *khoa* were determined at 15, 25, 35 and 45 °C over a a_w range of 0.11 - 0.97. The isotherms were sigmoid (Type II) and were fitted to the Guggenheim-Anderson-de-Boer (GAB) equation (Bizot, 1983). The a_w of freshly made *khoa* was found to be 0.96. The a_w of *khoa* increased with increasing temp. up to 0.9; above this the effect of temp. on a_w diminished. The monolayer moisture content of *khoa* decreased with increasing temp. The equations describing the temp. dependence of GAB constants were determined in the form of the Clausius-Clapeyron equation. The net isosteric heat of desorption of *khoa* decreased rapidly until a moisture level of 0.1 g/g solids and approached a constant value of 0.43 kJ/mol above a moisture level of 0.25 g/g solids. AS

Milk powder

1883

Barraquio (VL) and Van De Voort (FR). **Sodium caseinate from skim milk powder by extrusion processing: Physicochemical and functional properties.** *Journal of Food Science* 56(6); 1991; 1552-1556, 1561

Sodium caseinate produced on a pilot-plant-scale directly from skim milk powder (SMP) with two-step extrusion process was compared to a commercial product and a sodium caseinate prepared from commercial acid casein by extrusion-processing. The products were compared in terms of physicochemical properties and functional properties, as well as microbiological quality. Although differences existed between the caseinates, overall, those produced from SMP by extrusion appeared comparable to commercial caseinate. Results indicate that a good-quality sodium caseinate with the requisite properties

normally associated with commercial sodium caseinate could be produced directly from SMP by extrusion-processing. AS

Wheys

Whey proteins

1884

Padua (GW), Richardson (SJ) and Steinberg (MP). **Water associated with whey protein investigated by pulsed NMR.** *Journal of Food Science* 56(6); 1991; 1557-1561

Proton longitudinal relaxation rates were determined for whey protein powders and suspensions of solids concn. between 0.01 and 2.0 g solids/g water. Data showed 3 hydration regions. The relationship between relaxation rate and solids content was investigated for each region. The two-state model with fast exchange was applied to the dilute suspensions and the high-solids regions. This allowed identification of polymer water and free water states in dilute suspensions and also identification of polymer water and capillary water in high-solids preparations. For intermediate-solids mixtures the two-state model was extended to three water states: polymer, capillary and free. These models enabled calculation of the amount of each water state associated with whey protein at a given moisture content. AS

Yoghurts

1885

Vedamuthu (ER). **The yoghurt story - past, present and future. Part V.** *Dairy, Food and Environmental Sanitation* 11(8); 1991; 444-446

Aspects covered include body of yoghurt, texture in yoghurt, flavour in plain yoghurt and flavour control in fruit and flavoured yoghurts. BV

Milk proteins

Caseins

1886

McGookin (BJ) and Augustin (M-A). **Antioxidant activity of casein and Maillard reaction products from casein-sugar mixtures.** *Journal of Dairy Research* 58(3); 1991; 313-320

The antioxidant activity of casein and Maillard reaction products obtained by reaction of casein with glucose or lactose was studied. Antioxidant activity was evaluated in a model system containing methyl linoleate with haemoglobin as a pro-oxidant.

Casein was antioxidative and heating casein in the presence of glucose or lactose resulted in enhancement of antioxidant activity. The development of antioxidant activity in reacted casein-sugar mixtures was determined as a function of initial casein and sugar concn. The observed antioxidant activity of reacted casein-sugar mixtures was due to casein itself and Maillard reaction products resulting from reacting casein with sugar. AS

MEAT AND POULTRY

1887

Beltran (JA), Bonnet (M) and Ouali (A). **Collagenase effect on thermal denaturation of intramuscular collagen.** *Journal of Food Science* 56(6); 1991: 1497-1499

1888

Shahidi (F) and Pegg (RB). **Encapsulation of the pre-formed cooked cured-meat pigment.** *Journal of Food Science* 56(6); 1991: 1500-1504, 1518

Meat

1889

Bedinghaus (AJ) and Ockerman (HW). **Temperature, pH and bacterial populations of meat as influenced by home freezer failure.** *Journal of Food Science* 56(6); 1991: 1508-1510

The fate of frozen meat products (beef or pork) in home freezers when electrical power is interrupted is investigated. 14 packed meat (beef 3 and pork 11) samples with varying trial load wts (range = 43 - 128 kg) were frozen and power was disconnected. The packages within each lot were analysed daily for 9 days for temp., microbial count, and pH. After about 36 h without electrical power, the bacterial populations reached log 6 in the frozen samples. Thus it would not be advisable to use the meat held for 36 h after electrical power failure. BV

1890

Tsen (H-Y), Wang (S-J) and Green (SS). **Salmonella detection in meat and fish by membrane hybridization with chromogenic/phosphatase/biotin DNA probe.** *Journal of Food Science* 56(6); 1991: 1519-1523

1891

Ibrahim (A) and Mac Rae (IC). **Isolation of *Yersinia enterocolitica* and related species from red meat and milk.** *Journal of Food Science* 56(6); 1991: 1524-1526

Beef

1892

Hajduk (E) and Fik (M). **Application of glycerol to freezing bovine pancreas. Part 2. Effects of glycerol and grinding on frozen pancreas quality.** *Die Nahrung* 35(2); 1991: 127-132

1893

Anderson (ME), Marshall (RT) and Dickson (JS). **Efficacies of acetic, lactic and two mixed acids in reducing numbers of bacteria on surfaces of lean meat.** *Journal of Food Safety* 12(2); 1992: 139-147

1894

Chen (CM) and Trout (GR). **Sensory, instrumental texture profile and cooking properties of restructured beef steaks made with various binders.** *Journal of Food Science* 56(6); 1991: 1457-1460

1895

Chen (CM) and Trout (GR). **Colour and its stability in restructured beef steaks during frozen storage: Effects of various binders.** *Journal of Food Science* 56(6); 1991: 1461-1464, 1475

1896

Lanari (MC) and Cassens (RG). **Mitochondrial activity and beef muscle colour stability.** *Journal of Food Science* 56(6); 1991: 1476-1479

1897

Arganosa (GC), Godber (JS), Tanchotikul (U), McMillin (KW) and Shao (KP). **Processing ingredients affecting oxidative and textural stability of restructured beef roasts.** *Journal of Food Science* 56(6); 1991: 1480-1483, 1496

1898

Ahmed (PO), Miller (MF), Young (LL) and Reagan (JO). **Hot-fat trimming and electrical stimulation effects on beef quality.** *Journal of Food Science* 56(6); 1991: 1484-1488, 1499

1899

Mitsumoto (M), Cassens (RG), Schaefer (DM), Arnold (RN) and Scheller (KK). **Improvement of colour and lipid stability in beef *Longissimus* with dietary vitamin E and vitamin C dip treatment.** *Journal of Food Science* 56(6); 1991: 1489-1492

1900

Mitsumoto (M), Maeda (S), Mitsuhashi (T) and Ozawa (S). **Near-infrared spectroscopy**

determination of physical and chemical characteristics in beef cuts. *Journal of Food Science* 56(6); 1991: 1493-1496

Pork

1901

Hortin (AE), Bechtel (PJ) and Baker (DH). **Efficacy of pork loin as a source of zinc and effect of added cysteine on zinc bioavailability.** *Journal of Food Science* 56(6); 1991: 1505-1507

1902

Lamkey (JW), Mandigo (RW) and Calkins (CR). **Preblending hot- and cold-boned pork at different particle sizes.** *Journal of Food Science* 56(6); 1991: 1511-1513

Products

Hams

1903

Plimpton (RFJr), Perkins (CJ), Sefton (TL), Cahill (VR) and Ockerman (HW). **Rigor condition, tumbling and salt level influence on physical, chemical and quality characteristics of cured, boneless hams.** *Journal of Food Science* 56(6); 1991: 1514-1518

Patties

1904

Bielken (SL), Eadie (LM), Griffiths (I), Jones (PN) and Harris (PV). **Assessment of the textural quality of meat patties: Correlation of instrumental and sensory attributes.** *Journal of Food Science* 56(6); 1991: 1465-1469, 1475

1905

Beilken (SL), Eadie (I), Griffiths (I), Jones (PN) and Harris (PV). **Assessment of the sensory characteristics of meat patties.** *Journal of Food Science* 56(6); 1991: 1470-1475

Poultry

1906

Opiacha (JO), Mast (MG) and MacNeill (JH). **In-vitro protein digestibility of dehydrated protein extract from poultry bone residue.** *Journal of Food Science* 56(6); 1991: 1751-1752

Digestibility of the dehydrated protein extract from poultry bone residue was significantly ($P < 0.05$) lower than chicken breast muscle or mechanically

deboned poultry. Digestibility of the spray-dried extracts was about 3% higher than freeze-dried extracts. BV

Chickens

1907

Young (LL), Gracia (JM), Lillard (HS), Lyon (CE) and Papa (CM). **Fat content effects on yield, quality and microbiological characteristics of chicken patties.** *Journal of Food Science* 56(6); 1991: 1527-1528, 1541

Chicken thigh meat patties (CTMP) with 5, 10, 15 and 20% levels of fat were evaluated for Hunter color values, drip and cooking losses, proximate composition, texture profiles and rates of microbial spoilage. Raw CTMP became lighter and more yellow as fat content increased but cooking obscured these trends. As fat content increased, cooking losses and moisture:protein ratios increased. CTMP with lower fat level were harder, springier, less cohesive and chewier. Rates of bacterial spoilage were unaffected by fat content. BV

Turkeys

1908

Craig (J), Bowers (JA) and Seib (P). **Sodium tripolyphosphate and sodium ascorbate monophosphate as inhibitors of off-flavour development in cooked, vacuum-packaged, frozen turkey.** *Journal of Food Science* 56(6); 1991: 1529-1531, 1561

Products

Eggs

1909

Singh (RP) and Panda (B). **Comparative study on some quality attributes of quail and chicken eggs during storage.** *Indian Journal of Animal Science* 60(1); 1991: 114-117

Quail eggs are susceptible to quality deterioration as chicken eggs at ambient temp. (32 plus or minus 2 C). However, the decline in the quality of quail eggs in terms of albumen and yolk indices and percentage of thick white was found to be less than those of chicken eggs under refrigerated (5 plus or minus 1 C) storage. AS

1910

Arntfield (SD), Murray (ED) and Ismond (MAH). **Role of disulphide bonds in determining the rheological and microstructural properties of**

heat-induced protein networks from ovalbumin and vicilin. *Journal of Agricultural and Food Chemistry* 39(8): 1991: 1378-1385

The involvement of disulphide bonds in heat-induced networks from ovalbumin and vicilin was investigated by incorporating cysteine hydrochloride (CysHCl), mercaptoethanol (ME), and N-ethylmaleimide (NEM) during network formation. Network evaluation was based on rheological properties (small amplitude oscillatory testing) and microstructure (light microscopy). Low G' (storage) and G'' (loss) moduli, elevated $\tan \delta$ (G''/G') values, and a reduction in protein cross-linking at ME and NEM concn. of 25 and 50 mM supported disulphide bond involvement in ovalbumin networks. The impact of these reagents was seen during the final stage of cooling. Vicilin networks were unaffected by these reagents, indicating no disulphide bond involvement. While disulphide bonds may contribute to the elasticity and strength of a protein network, noncovalent forces are key to initial network formation. AS

1911

Causeret (D), Matringe (E) and Lorient (D). **Ionic strength and pH effects on composition and microstructure of yolk granules.** *Journal of Food Science* 56(6): 1991: 1532-1536

The microstructure of hen egg granules was investigated. Polyacrylamide gel electrophoresis revealed that the granules consisted of 3 proteins (low-density lipoprotein, lipovitellin and phosvitin). Atomic absorption spectrometry revealed a notable amount of divalent and trivalent cations. Scanning microscopy showed that pH modifications induced the loss of granule structure by solubilization of proteins. Similar observations were made when ionic strength was increased by addition of NaCl. All results were indicative of the existence of phosphocalcic bridges between phosphate groups of the 3 proteins. AS

1912

Kwan (L), Li-Chan (E), Helbig (N) and Nakai (S). **Fractionation of water-soluble and -insoluble components from egg yolk with minimum use of organic solvents.** *Journal of Food Science* 56(6): 1991: 1537-1541

A process was developed to fractionate both water-soluble and water-insoluble components from egg yolk with max retention of biological and functional properties. About 60-90% of the immunological activity of yolk was recovered in a supernatant after centrifugation of yolk diluted six- to tenfold with water. The remaining yolk pellet had excellent emulsifying properties for mayonnaise

preparation. It was further fractionated by deoxycholate treatment to separate triglycerides (80% recovery). Ultrafiltration of the deoxycholate supernatant yielded protein (74% recovery) in the retentate, and phospholipids and cholesterol in the permeate. Phospholipids were then purified by dichloromethane:ethanol (3:1) extraction, zinc chloride preparation and acetone washing. AS

SEAFOODS

1913

Sado (PN). **Isolation of luminescent bacteria from cooked seafood products.** *Dairy, Food and Environmental Sanitation* 11(7): 1991: 361-363

This investigation summarizes a 2 yr study of luminescent bacteria in cooked seafood products (cooked and peeled shrimp and imitation crab meat). *Photobacterium phosphoreum* and *Vibrio logei* the two luminescent bacteria have been isolated from cooked seafood products. SRA

1914

Nagashima (Y), Noguchi (T), Tanaka (M) and Hashimoto (K). **Thermal degradation of paralytic shellfish poison.** *Journal of Food Science* 56(6): 1991: 1572-1575

A mixture of gonyautoxin 2 and gonyautoxin 3 (components of paralytic shellfish poison (PSP) prepared from the toxic scallop digestive glands) dissolved in water and heated at 100, 110 and 120 C for 180 min, retained 39, 17 and < 3% respectively of initial toxicity. A mixture of gonyautoxin 1 gonyautoxin 4 was more thermolabile; it retained little toxicity when heated at 120 C for 60 min. HPLC and TLC analyses demonstrated that heating under above conditions converted PSP components into other substances. BV

Prawns

1915

Gupta (J). **Adoption of quality control measures in centralised and decentralised prawn peeling units - a comparative study.** *Fishery Technology* 29(1): 1992: 72-74

A comparative study on the infrastructural measures adopted in 150 centralised and 50 non-centralised prawn peeling units was carried out. 9 quality controls such as floor facilities, lighting and ventilation, construction and layout, facilities in surroundings, water and ice availability, sanitary facilities, tables and utensils, working facilities in peeling hall, and toilet facilities were

studied. It was found that the centralised prawn peeling units had better infrastructural facilities related to quality control compared to non-centralised peeling units. Imposition of quality control measures helped considerably to improve the quality standards of peeling sheds. SRA

Shrimps

1916

Chakrabarti (R), Gupta (SS), Rao (CCP) and Basu (S). **Control of black discoloration in raw shrimps from tropical region.** *Fishery Technology* 29(1): 1992; 84-85

Headless *P. indicus*, *Penaeus monodon* and *Metananeus monoceros* shrimps collected from local market, were dipped in 0.3, 0.4 and 0.5 sodium metabisulphite (SMS) sol. for 30 s, packed in crushed ice and stored for 5 days. The residual SO₂ in meat estimated at regular intervals showed an increase in proportion to the concn. of the dip sol.: 0.3% SMS was sufficient to control black spot in *P. monodon* and *P. indicus* during 5 day storage. A dip in 0.4% sms was needed to control black spot in *M. monoceros*. SRA

Fish

1917

Hagura (Y) and Watanabe (H). **Factors affecting separation of low-fat flesh from fatty fish by cryo-shattering.** *Journal of Food Science* 56(6): 1991; 1567-1571

1918

Basavakumar (KV), Indrani Karunasagar and Iddya Karunasagar. **Ability of fish associated bacteria to produce amines suspected to be involved in scombroid poisoning.** *Indian Journal of Microbiology* 32(1): 1992; 75-79

The ability of bacteria associated with fresh and market fish to produce histamine from histidine, cadavarine and putrescine from lysine was studied. Only Gram negative histamine formers such as *Pseudomonas*, *Vibrio*, *Moraxella* and *Proteus* were observed. It was confirmed that a number of bacteria present in fish were capable of decarboxylating histidine at refrigeration temp. Bacteria present in fish such as *Vibrio*, *Plesiomonas*, *Proteus*, *Staphylococcus*, *Micrococcus*, *Arthrobacter* and *Bacillus* can decarboxylate lysine to cadavarine. Histamine and cadavarine producing bacteria were present commonly in fish harvested near shore water, while putrescine forming bacteria were found only occasionally. Freshly harvested fish harboured a number of histidine and lysine decarboxylating

bacteria. Ornithine decarboxylating ability was rarely observed in fish associated bacteria. GS

Eel

1919

Lee (H) and Tsai (S-J). **Detection of IQ-type mutagens in canned roasted eel.** *Food and Chemical Toxicology* 29(8): 1991; 517-522

Canned roasted eel exhibited the highest mutagenicity due to the formation of 2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline (MeIQx) and 2-amino-3,7,8-trimethylimidazo[4,5-f]quinoxaline (7,8-DiMeIQx). HPLC analysis showed MeIQx and 7,8-DiMeIQx were 1.1 ng and 5.3 ng/g of canned roasted eel, respectively. Cooking temp. and time seemed to be the major factors affecting mutagen formation in fried eel. The type and amount of mutagenic compounds detected in canned roasted eel are likely to be correlated with the relative levels of specific free amino acids in raw eel. BV

Menhaden

1920

Rhodehamel (EJ), Solomon (HM), Lilly (TJr), Kautter (DA) and Peeler (JT). **Incidence and heat resistance of *Clostridium botulinum* type E spores in Menhaden surimi.** *Journal of Food Science* 56(6): 1991; 1562-1563, 1592

Raw Menhaden surimi (*Brevoortia tyrannus*) was examined to determine the incidence of *Clostridium botulinum* spores. Seven of 565 test portions (1.2%) were positive for type E spores. The thermal death time (TDT) tube method was used to determine the heat resistance of *C. botulinum* type E spores inoculated into the remaining 558 negative portions. Calculated mean D-values in mm were 8.66 at 73.9 C, 3.49 at 76.7 C, 2.15 at 79.4 C, and 1.22 at 82.2 C. The z-value of the phantom TDT curve was 9.78 C. The data indicate previously reported minimal time/temp. thermal processes used to set surimi gel provide an adequate margin of safety with regard to *C. botulinum* type E. AS

Rockfish

1921

Wasson (DH), Reppond (KD) and Kandianis (TM). **Antioxidants to preserve rockfish colour.** *Journal of Food Science* 56(6): 1991; 1564-1566

Thornyhead rockfish (*Sebastes alascanus*) were treated with antioxidants (tocopherol alone, tocopherol + ascorbic acid (TCAA), BHT, and sodium

erythroate) to preserve the red skin colour during frozen storage. TCAA treated fish at 4 months showed significantly higher red colour scores than any other treatment group, as measured using the CIE L*a*b* scale. The TCAA dip also enhanced the red colour compared to pre-treatment values. BV

Salmon

1922

Josephson (DB), Lindsay (RC) and Stuiber (DA). **Influence of maturity on the volatile aroma compounds from fresh Pacific and great lakes salmon.** *Journal of Food Science* 56(6); 1991: 1576-1579, 1585

Products

1923

Reddy (NR), Armstrong (DJ), Rhodehamel (EJ) and Kautter (DA). **Shelf-life extension and safety concerns about fresh fishery products packaged under modified atmospheres: A review.** *Journal of Food Safety* 12(2); 1992: 87-118

The potential benefits and possible safety concerns associated with modified atm. (MA) packaging which reduces the losses and extends the shelf-life of fresh seafood products are reviewed in this article. Aspects covered are MA packaging, uses of gases in MA packaging, bacterial growth inhibition and shelf-life extension by MAs, pretreatment of fishery products before vacuum and MA packaging, safety concerns and risks and the methods for minimizing or eliminating safety risks. 96 references. CSA

Crackers

1924

Yean (YS). **Acceptability of fish crackers (Keropok) made from different types of flour.** *ASEAN Food Journal* 6(3); 1991: 114-116

Malaysian fish crackers (Keropok) prepared using 6 ingredient combinations (2 types of fish, sardine (*Clupea lelogaster* and Jewish-Johnius (*pseudosclaeana*) soldado Lac., and 3 types of flours (sago, tapioca and whole wheat) were evaluated. Fish crackers made from tapioca and sago flours had the highest linear expansion and were preferred by taste panelists. Wheat flour 'Keropok' has the highest protein content, lowest linear expansion and were least acceptable. Sensory characteristics were not affected by the type of fish used. BV

PROTEIN FOODS

Infant foods

1925

Singh (MN) and Mathur (BN). **Development of maternalized infant formula. Part V. Storage related physico-chemical changes.** *Indian Journal of Dairy Science* 44(10); 1991: 614-619

Various physico-chemical changes taking place in the Maternalized Infant Formula (MIF) during storage at 37 C were monitored over 12 months. Practically no changes were noted in the moisture content, pH and titratable acidity. Reflectance spectroscopy evidenced absence of any changes in the colour characteristics during the first four months of storage. Only a marginal increase in the reflectance spectra representing yellow, orange and red hues was observed at a steady rate with further storage upto 12 months. However, the product remained quite acceptable in terms of colour characteristics. Storage related changes in the reconstitution characteristics, viz, dispersibility, wettability, suitability index and flowability were only nominal, and remained within acceptable limits prescribed for spray-dried infant formulas. All the changes in the parameters effecting the reconstitution behaviour could be modelled mathematically, and could be useful to predict the storage behaviour of the product. AS

1926

Kumar (KR) and Venugopal (JS). **Moisture sorption behaviour of infant milk food formulations.** *Indian Journal of Dairy Science* 44(10); 1991: 632-638

Water vapour desorption and adsorption characteristics of spray and roller dried infant milk food formulations were determined at 27 C. The adsorption isotherms, although sigmoid in shape, indicated a smooth curve and hysteresis in the intermediate humidities. The monomolecular moisture contents at 27 C were found to be 3.1 and 2.96% respectively for spray and roller dried milk foods. Scanning electron microscopy study on the effects of water vapour adsorption on the crystallisation of amorphous lactose indicated that the globular nature of the infant milk food was gradually affected above 43% rh and crystallization was observed at higher humidities. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

1927

Lommi (H), Gronqvist (A) and Pajunen (E). **Immobilized yeast reactor speeds beer production.** *Food Technology* 44(5): 1990; 128, 130, 133

This article attempts to describe the technical and economic aspects of a continuous secondary fermentation-maturation process for the production of beer based on the use of an immobilized yeast reactor system which can be completed within 2-3 h as against the beer matured in conventional lagering cellars which takes 10-14 days. CSA

Wines

1928

Davenel (A), Grenier (P), Foch (B), Bouvier (JC), Verlaque (P), Pourcin (J). **Filter, Fourier transform infrared, and areometry for following alcoholic fermentation in wines.** *Journal of Food Science* 56(6): 1991; 1635-1638

Areometry, filter near infrared spectrometry (FIR), and Fourier transform near infrared spectrometry (FTIR), have been compared for following total sugar and ethanol during fermentations. Standard errors of calibration (SEC) and prediction (SEP) have been estimated, respectively, with 4 and 2 fermentations, using as reference sugar and ethanol enzymatic analysis. With the first 4 fermentations, the least rectangles methods was applied for a more through comparison between FIR, FTIR, and areometry. FIR was more complex and more accurate than density measurement, and less complex, but as accurate as FTIR spectrometry. Small SEP can be achieved with FIR spectrometry: 2.5 g/L for total sugars and 0.15% (v/v) for ethanol. AS

Non-alcoholic beverages

1929

Crivaro (NO) and Carron (RB). **Orange cremogenate determination in non-alcoholic beverages, by quantitative micrographic analysis.** *Anales de Bromatologia* 42(1): 1990; 151-165 (Es)

A method to determine the amount of citrus peel and/or cremogenate in non-alcoholic beverages, by means of quantitative analysis, is presented, which

also indirectly makes possible to know its healthy properties and regulation adjustment. This procedure may be applied to both industrial and official levels to control raw materials and final products. Statistical results are given. AS

1930

Palaniappan (S) and Sastry (SK). **Electrical conductivity of selected juices: Influences of temperature, solids content, applied voltage and particle size.** *Journal of Food Process Engineering* 14(4): 1991; 247-260

A device was developed to determine the electrical conductivities of foods under ohmic or conventional heating conditions. Orange and tomato juices (serum and various solids contents) were tested in the device. The electrical conductivity of juices increased with temp. and decreased with solids content. The temp. dependence of conductivity was linear, both under conventional and ohmic heating. Experiments on suspensions of carrot juice solids, and polystyrene spheres in sodium phosphate solution showed an increase in electrical conductivity of the suspension with decreasing particle size. AS

Fruit juices

1931

Mitchell (GE), Isaacs (AR), Williams (DJ), McLauchlan (RL), Nottingham (SM), Hammerton (K). **Low dose irradiation influence on yield and quality of fruit juice.** *Journal of Food Science* 56(6): 1991; 1628-1631

Low dose irradiation (< 600 Gy) of Granny Smith apples, Valencia oranges, and Pearlette grapes (Queensland, Australia) resulted in significant ($P < 0.05$) decrease in juice yields from apples (6.3% w/w) and grapes (4.8% w/w); and no change in juice yield from oranges ($P > 0.05$). Acceptability significantly ($P < 0.05$) decreased in orange juice after irradiation (600 Gy). Irradiation treatment caused only minimal changes in fruit juice composition. Juice from irradiated apples and oranges stored at 5 C for 8 wk showed similar results. BV

Apple juices

1932

Cliff (M), Dever (MC) and Gayton (R). **Juice extraction process and apple cultivar influences on juice properties.** *Journal of Food Science* 56(6): 1991; 1614-1617, 1627

Effects of several processing methods (oxidative, nonoxidative, diffusion extraction, enzyme

liquefaction) on varietal apple juice character was examined. Analytical evaluations included titratable acidity, soluble solids, pH, phenol, suspended solids, turbidity, Hunterlab colour, organic acids and sugars and showed definite extraction process and cv differences. Sensory evaluation identified eight attributes, colour, clarity, fruity aroma, oxidized, fruity flavour, sweet, sour, astringent, as significant factors in characterizing differences among the juices. Canonical discriminant analyses (CDA) of analytical data showed correct allocation of all juices to both process type and var. CDA of sensory data, revealed a significant separation of processes but not all cvs. AS

Citrus juices

1933

Widmer (WW). **Improvement in the quantitation of limonin in citrus juice by reversed-phase high-performance liquid chromatography.** *Journal of Agricultural and Food Chemistry* 39(8): 1991: 1472-1476

A cyano stationary phase was found to have good selectivity for reversed-phase HPLC analysis of limonin in citrus juices. The cyano stationary phase is, however, susceptible to contamination by constituents contained in citrus juices. A method is described for solid-phase extraction (SPE) of limonin from citrus juices followed by reversed-phase analysis. The method has a rapid sample preparation, does not cause premature deterioration of the analytical column, and offers an improved separation of limonin from other constituents over previously described reversed-phase methods. The SPE procedure provided 95-108% recovery and 2-4-fold concn. of limonin in extracts for increased sensitivity with UV detection at 214 nm. Limonin is extracted into 70% methanol, and extracts were stable for 30 days if kept at -4 C. Juices analyzed for limonin included white and pink grapefruit varieties, 'naval', 'Valencia', 'Hamlin', and 'sour oranges'. AS

Orange juices

1934

Castaldo (D), Lovol (A), Quagliuolo (LServilloL), Balestrieri (C) and Giovane (A). **Orange juices and concentrates stabilization by a proteic inhibitor of pectin methylesterase.** *Journal of Food Science* 56(6): 1991: 1632-1634

A proteic inhibitor of pectin methylesterase (PME), recently discovered in kiwi, was used to stabilize cloud of orange juice concentrate with "Cut-back", 42° Brix. To conc. and pasteurized orange juice

were added increasing amounts of fresh juice (12° Brix) with PME 0.8 U/mL at the fresh to pasteurized ratios 6.6 to 38%. The PME inhibitor (65% pure), from kiwi, was added at 50 mg/L. After 8 mo at 5 C samples were compared with controls containing the same amount of fresh juice with PME inhibited by pasteurization. Pasteurized samples were not different from those treated with PME inhibitor. Conversely, where PME was not inhibited, cloud stability decreased with increasing amounts of fresh juice. Use of kiwi PME inhibitor in fruit juice production has potential advantages. AS

Pineapple juices

1935

Doko (MB), Valente (M), Jacob (M) and Puech (A). **Consequences of fouling and macromolecule adsorption onto ultrafiltration membrane for pineapple juice processing.** *Journal of Food Process Engineering* 14(4): 1991: 279-289

Pineapple juice samples were ultrafiltrated using a polysulfone 10,000 mol. wt cut-off (MWCO) membrane. However, to facilitate operations, the ultrafiltration experiments were preceded by fractionation of juice samples using sequentially Microfiltration/Diafiltration and Ultrafiltration/Diafiltration with 8 µm; 0.4 µm; 0.2 µm and 0.1 µm membranes, using three specific experimental procedures. The 10,000 MWCO membrane was cleansed using a 40 C in NaOH solution for a min of 30 min., to restore optimal membrane water permeation flux. The effects of selective fractionation processes, pretreatments (using antifoaming agent, hemicellulase and ammonium sulphate saturation), on permeation rates, concn. levels, protein rejection and protein yields were determined. Water permeation fluxes, measured before and after each UF operation showed a dramatic flux drop from 313 L/hm² to 91 L/hm² within 7 successive 10,000 MWCO membrane experiments. This occurred inspite of suitable membrane washing conditions, pretreatments and selective fractionation processing of samples. The modification, mainly due to fouling, of the integrity of the 10,000 MWCO membrane relative to concn. level was investigated. AS

Tea

1936

Sud (RG) and Bhattacharjee (BK). **Seasonal variations of theaflavins, thearubigins, brightness, colour, quality and mineral composition of Kangra tea (*Camellia sinensis*).** *Indian Journal of Agricultural Sciences* 62(2): 1992: 139-143

Made tea of Kangra Valley collected from Palampur, India, on weekly intervals during 1989 (April-October) contained thearubigins 3.156 - 5.326%, theaflavins 0.110 - 0.353%, thearubigins:theaflavins ratio 10.80 - 31.51, total colour 1.02 - 2.15 and brightness 10.26 - 27.63%. Hard withering (55 - 60%) and low (< 2 C) difference between room and floor temp. during fermentation improved the total colour (1.26 - 2.15) and brightness (0.26 - 19.76%) of rainy-season tea. Rainy-season tea fetched higher price than the winter season tea during 1989 and 1990. Mineral contents in made tea were Cu 51 - 124 µg/g, Mn 534 - 763 µg/g, Zn 24 - 42 µg/g, Fe 186 - 407 µg/g, Ca 0.17 - 0.36%, K 2.49 - 2.57%, Mg 0.18 - 0.30% and P 0.22 - 0.37%. KAR

FATS AND OILS

1937

Perez-Camino (MC), Ruiz-Marquez (G), Ruiz-Mendez (MV) and Dobarganes (MC). **Lipid changes during frying of frozen prefried foods.** *Journal of Food Science* 56(6); 1991; 1644-1647, 1650

Fat absorption, lipid interchange and preferential adsorption of polar compounds on food surfaces were studied during frying and frozen prefried foods. Frozen potatoes and battered hake were fried with four frying oils. Significant differences in fat absorption due to the physical structure of foods was seen. Polar compound concn. and distributions demonstrated no preferential adsorption on food surfaces during frying of these prefried foods. From quantitation of major fatty acids, lipid interchange between frying oils and food fats could be determined. BV

1938

Satyanarayana (T) and Johri (BN). **Lipids of thermophilic moulds.** *Indian Journal of Microbiology* 32(1); 1992; 1-14

Reviews lipid categories; lipid contents; lipid distribution in the cell; composition of lipids; fatty acid profiles; degree of saturation and unsaturation in neutral and polar lipids; membrane lipids; and commercial process for lipid production from thermophilic moulds. 52 references. GS

OILS

1939

Guardiola (MF) and Escarpenter (FC). **Determination of tetrachloroethylene and trichloroethylene in food by gas chromatography**

- **automatic injection head-space and electron capture detector.** *Grasas y Aceites* 41(1); 1990; 19-22 (Es)

This work presents the research performed about the detn. of tetrachloroethylene and trichloroethylene in the commercial oils, extending it to another kind of foods which have some industrial manufacture, such as butter, cheese, sausage and so on. The analysis is carried out by GC, head-space on capillary column and electron capture detector (ECD). It offers a relation between moisture's values of samples and the tetrachloroethylene concn. AS

1940

Sattar (A), Jan (M), Ahmad (A) and Durrani (SK). **Peroxidation and heavy metals of dry nuts oils.** *Acta Alimentaria* 19(3); 1990; 225-228

The peroxidation rate of packed almond, groundnut, pinenut and walnut oil exposed to fluorescent light ($P < 0.05$) increased significantly and the order was walnut > pinenut > groundnut > almond. Amber glass provided max protection against the photooxidation. Concn. of metals (Zn, Cu, Pb and Cd) showed marked variations (coeff. variation 35.6 - 66.1). BV

1941

Toro-Vazquez (JF). **Interactions among oil components during adsorption: Effects on carotenoids and peroxides.** *Journal of Food Science* 56(6); 1991; 1648-1650

Soybean, cottonseed, corn and squash seed oils were treated for 3 h with activated carbon (1, 2.5 and 5%) in a batch adsorption system at 50 and 90 C. Peroxides (P_a) and carotenoids (C_a) were determined after adsorption. Equations that described the P_a and C_a variability were developed through discriminatory multiple regression analysis using as independent variables chemical characteristics of the oils (iodine and saponification index, peroxides, carotenoids and free fatty acids, saturated/unsaturated fatty acids ratio), process temp. and adsorbent concn. Variables in the models explained approx. 85% and approx. 93% of the total variability observed in the P_a and C_a concn. respectively, independent of oil source. AS

Canola oils

1942

McMullen (LM), Hawrysh (ZJ), Lin (C) and Tokarska (B). **Ascorbyl palmitate efficacy in enhancing the accelerated storage stability of canola oil.** *Journal of Food Science* 56(6); 1991; 1651-1654, 1659

The effect of various levels of ascorbyl palmitate (AP) and of BHA/BHT on the accelerated storage stability of canola oils was determined by sensory, GLC and chemical evaluations. In Schaal oven tests (65 C, 0-16 days), chemical, GLC and trained sensory panel data indicated that 200 p.p.m. AP retarded autoxidation in stored canola oils. Monoglyceride citrate (MGC) addition to oils containing 200 p.p.m. AP did not enhance oil stability. Fluorescent light tests (7500 lux, 24 C, 0-24 h) showed that 200 p.p.m. AP, with or without MGC, had a limited effect in protecting canola oil from photooxidation. BHA/BHT, at 100 p.p.m. each, with MGC, did not improve canola oil stability. AS

Coconut oils

1943

Nanda Kumar (TB). **Coconut oil: The king of vegetable oils ?**. *Indian Coconut Journal* 22(6/7): 1991: 51-55

A general type of article wherein the qualities of coconut oil as a source of energy in human diets, its digestibility and nutritive values, the chemical and germicidal properties of coconut oil, the essential acids present in it, the protection it offers to the skin and hair, its medicinal uses and its use in heart diseases, its use in the suppression of the growth of side branches and many more advantages are discussed. CSA

SPICES AND CONDIMENTS

Spices

1944

Evert Ting (WT) and Deibel (KE). **Sensitivity of *Listeria monocytogenes* to spices at two temperatures**. *Journal of Food Safety* 12(2): 1992: 129-137

Thirteen spices were screened for growth inhibition effect against *Listeria monocytogenes* at 24 C using a concn. gradient plate method. Cloves and oregano were the two most inhibitory spices with MIC values ranging from 0.5 to 0.7% (W/V). Inhibition was also detected with sage and rosemary (MIC of 0.7 to 1.0%) as well as nutmeg (MIC of 1.1 - 1.4%). Black pepper, chili, cinnamon, garlic, mustard, paprika, parsley and red pepper at a concn. up to 3.0% did not inhibit the growth of the organisms. The effect of cloves, oregano and sage on the growth and survival of *L. monocytogenes* Scott A was further tested in tryptic soy broth at both 4 and 24 C. At a concn. of 0.5 or 1.0%, cloves were bactericidal and oregano was

bacteriostatic to this organism at both incubation temp. Sage at these two concn. was bactericidal at 4 C and bacteriostatic at 24 C. When tested in sterile meat slurry, a 1.0% level of either cloves or oregano had little effect on the growth of *L. monocytogenes* Scott A at 4 or 24 C. AS

SENSORY EVALUATION

1945

Martin (D). **The impact of branding and marketing on perception of sensory qualities**. *Food Science and Technology Today* 4(1): 1990: 44-49

1946

Macfie (H). **Directions for sensory and consumer research in the 1990s**. *Food Science and Technology Today* 4(1): 1990: 50-52

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Nil

BIOCHEMISTRY AND NUTRITION

1947

Southgate (D). **Dietary fibre: Changing our perception of the nutritional properties of carbohydrates**. *Food Science and Technology Today* 4(1): 1990: 23-25

1948

Conning (D). **Towards 2000: Nutrition and consumer expectations**. *Food Science and Technology Today* 4(1): 1990: 26-28

1949

Herman (S), Sediaoetama (AD), Karyadi (D) and Beynen (AC). **Influence of background composition of the diet on the lipedemic effect of fish oil vs corn oil in rats**. *Journal of Nutrition* 121(5): 1991: 622-630

Rats were fed diets containing fish oil or corn oil differing in fat, cholesterol, type of carbohydrate or protein. The background diet composition did not influence the hypotriglyceridemic effect of fish oil vs

corn oil and the effect was diminished by increasing the coconut fat in the background diet at the expense of an iso energetic amount of sucrose. No cholesterol-lowering effect of fish oil vs corn oil was noticed with high cholesterol diets. Therefore the composition of the background diet should be considered while comparing the cholesterolemic effects of fish oil with other oils. SD

1950

Sarwar (G) and Brule (G). **Assessment of the uricogenic potential of processed foods based on the nature and quantity of dietary purines.** *Progress in Food and Nutrition Science* 15(3); 1991: 159-181

Among the 4 purine bases (adamine, guanine, hypoxanthine and xanthine), adamine and hypoxanthine seem to be more uricogenic than its nucleoside or nucleotide, when fed to animals, changes in the contents of purines and release of free bases occur during various cooking procedures such as stewing, roasting, boiling and broiling of meat, poultry and fish products. Hence the uricogenic potential of processed foods should be based on the nature and quantity of dietary purines. Review. 74 references. GS

1951

Roe (MA) and Faulks (RM). **Color development in a model system during frying: Role of individual amino acids and sugars.** *Journal of Food Science* 56(6); 1991: 1711-1713

The colour of fried potato products is limited by reducing sugars, but can be affected by free amino acids. Filter paper discs saturated with solutions of amino acids in combination with glucose, fructose and sucrose were fried in oil to investigate colour formation. Four phases of colour development were identified; equilibrium, lag, rapid and slow phase, corresponding to the water content of the system. Lysine, γ -aminobutyric acid and glycine produced most colour and glutamic acid least. Fry colour of glucose and fructose systems was very similar, but sucrose systems produced less colour. Glucose and fructose systems were not affected by pH changes, but there was a slight effect on sucrose systems. AS

1952

Hamada (JS). **Membrane reactor for enzymic deamidation of food proteins.** *Journal of Food Science* 56(6); 1991: 1725-1728

A soy protein hydrolysate was deamidated with peptidoglutaminase (PGase) retained within a 30kd spiral membrane. Reactor was operated at 30 C and 6.5 L/m²/h flux in recycle mode to 60% conversion, then in diafiltration mode for 2 h. Time course,

predicted by a Michaelis-Menten equation integrated for mixed zero- and first-order kinetics with the corrections for the ultrafiltration (UF) interactions, matched that measured experimentally. The equation could be used to predict the potential activity and performance of PGase in UF reactors to achieve control of reactions for the optimal enzymic process. At the end of the run, 96% conversion and 99% of PGase were obtained. This method has the potential of being scaled-up for the production of enzyme-free deamidated proteins. AS

1953

Hamada (JS). **Ultrafiltration for recovery and reuse of peptidoglutaminase in protein deamidation.** *Journal of Food Science* 56(6); 1991: 1731-1734

Ultrafiltration (UF) of *Bacillus circulans* cell extract using a 100kd hollow-fiber membrane had no effect on peptidoglutaminase (PGase) activity and allowed 34 and 26% of PGases I and II to permeate. UF, with 30kd spiral membrane, slightly increased PGase activity in retentate but no activity was detected in permeate. Retentate was used to sequentially deamidate four batches of a soy protein hydrolysate at 30 C for 2 h, then PGase was recovered by UF. The 100kd membrane resulted in substantial PGase loss in sequential tests due to permeation and inactivation. A 100% conversion of 97% of PGase were obtained after tests with the 30 kd membrane. Multiple recovery and use of PGase by a suitable membrane is possible. AS

1954

Bhattacharyya (R) and Samanta (TK). **L-Lysine production by double auxotrophic and AEC resistant mutants of *Arthrobacter globiformis* TR9.** *Research and Industry, India* 37(1); 1992: 1-6

Microorganisms producing lysine in the mineral salt medium were isolated from 20 soil samples and lysine extractor (2 g/l) identified as *Arthrobacter globiformis* TR9 was selected for further study. The mineral salt medium of white was the best for lysine production. Biotin at 5 μ g/l, ammonium chloride 75 mM and glucose at 5% were found to be optimum for lysine production. S-2 (aminoethyl)-L-cysteine resistant mutant, AEC 50^r 62 derived from potent methionine plus theornine double auxotroph yielded 32 g lysine per l of medium under optimal C and N sources in flask culture. GS

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

1955

Lee (H) and Tsai (S-J). Effect of emodin on cooked-food mutagen activation. *Food and Chemical Toxicology* 29(11); 1991: 765-770

The antimutagenic activity of herbs (*Rheum palmatum* B and *Polygonum cuspidatum* S) and emodin (a product of food-borne fungi and a

constituent of edible and medicinal plants. *R. palmatum* B and *P. cuspidatum* S) was examined in *Salmonella typhimurium* TA98. The crude extracts and emodin induced a dose-dependent decrease in the mutagenicity of beno[a]pyrene, 2-amino-3-methylimidazo[4,5-f]quinoline(IQ) and 3-amino-1-methyl-5-H-pyrido[4,3-b]indole(Trp-P-2). Emodin also reduced the mutagenicity of IQ by direct inhibition of the hepatic microsomal activation and not by interaction with proximate metabolite of IQ and/or by modification of DNA repair processes in the bacterial cell. GS

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- Mill**
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- Milletia**
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- Milling**
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- Miltone**
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- Moisture**
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khoa, temp. & moisture sorption isotherms of 1882
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- Mould**
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- Mung bean**
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- Muscle**
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- Mustard**
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- Mutagen**
eel, IQ-type mutagens detection in canned roasted 1919
emodin & activation of cooked-food mutagens 1955
- Myceliophthora thermophila**
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- Mycotoxin**
fruits, mycotoxins in Nainital market dry 1847
- Myrtus communis**
cereals/oilseeds, aflatoxin inhibition *M. communis* extract in 1793
- NIR**
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- NMR**
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whey proteins, water association NMR detn. with 1884
- Navy bean flour**
wheat dough, navy bean flour grade & rheology/microstructure of 1867
- Neosartorya fischeri**
preservatives/temp. & growth of *N. fischeri* 1786
- Nitrosamine**
wheat grain, drying & N-nitrosamine content of 1801
- Nutmeg**
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- Nutrition**
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- Nutritional value**
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- Nutritional values**
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- Oat**
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- Oat meal**
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- Oat protein**
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- Oil**
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- metals of dry 1940
- peroxides/carotenoids in vegetable oils 1941
- Oils fish**
- lipidemic effect of fish oil 1949
- Oncorhynchus**
- see Salmon
- Orange cremogenate**
- beverages, orange cremogenate detn. in non-alcoholic 1929
- Orange juice**
- electrical conductivity of orange juices 1930
- irradiation & yield/quality of Valencia orange juices 1931
- pectin methylesterase & stabilization of orange juices 1934
- Orange juice concentrate**
- pectin methylesterase & stabilization of orange juice concentrate 1934
- Oregano**
- temp. & *Listeria monocytogenes* sensitivity to oregano 1944
- Osmosis**
- potatoes, NaCl & osmotic dehydration of 1833
- Ovalbumin**
- rheological/microstructural changes of heat-induced protein networks from ovalbumin 1910
- Oxidation**
- beef roasts, processing ingredients & oxidative stability of restructured 1897
- Packaging**
- food packaging technologies 1765
- Packaging modified atmosphere**
- fishery products, shelf-life extension of packed 1923
- Papaya**
- firmer-textured canned/frozen tropical papaya 1852
- Paprika**
- temp. & *Listeria monocytogenes* sensitivity to paprika 1944
- Parsley**
- temp. & *Listeria monocytogenes* sensitivity to parsley 1944
- Pasta**
- cooking, starch gelatinization in pasta 1868
- Pasteurization**
- tofu, bacteria & gas production inhibition in 1826
- Patatin**
- potatoes, patatin purification modified method form 1835
- Patty**
- meat patties, sensory properties of 1905
- meat patties, textural quality of 1904
- Pectin**
- strawberry jams, pectin & volatile compounds/sensory properties of 1858
- Pectin methylesterase**
- orange juice/orange juice concentrate, pectin methylesterase & stabilization of 1934
- Penaeus**
- see Shrimp
- Penicillium caseicolum**
- aminopeptidase purification/debittering from *P. caseicolum* 1784
- Pentosan**
- rye pentosans, oxidative gelation of 1800
- Pepper**
- black pepper, temp. & *Listeria monocytogenes* sensitivity to 1944
- Peppers**
- green peppers, blanching steam & cyclohexylamine residue in 1837
- red pepper, temp. & *Listeria monocytogenes* sensitivity to 1944
- Peptidoglutaminase**
- protein deamidation, ultrafiltration & peptidoglutaminase in food 1953
- Peroxidation**
- nut oils, peroxidation of dry 1940
- Peroxide**
- oils, peroxides in vegetable 1941
- Pervaporation**
- apple essence, flavour compounds recovery/concn. pervaporation in 1851
- Phenoloxidase**
- Aureobasidium pullulans*, pigmentation/phenol oxidase during pullulan production by 1781
- Aureobasidium pullulans*, pigmentation/phenoloxidase during pullulan production by 1781
- Physical property**
- beef cuts, physical characteristics NIR spectroscopy detn. in 1900
- goat milk, processing & physicochemical property changes in 1872
- infant formula, physico-chemical changes in stored 1925
- Physiology**
- fruits/vegetables, physiological activities of partially processed 1849
- Pickling**
- fruits/vegetables, pickled 1838
- Pigmentation**
- Aureobasidium pullulans*, pigmentation/phenoloxidase during pullulan production by 1781
- Pineapple juice**
- ultrafiltration membrane for pineapple juice processing 1935
- Policy**
- agro-exports, policy on 1757
- food industry, policy on processed 1756
- food processing sector, government policy in Indian 1758
- Polycyclic aromatic hydrocarbon**
- wheat grain, drying & polycyclic aromatic hydrocarbon in 1801
- Polysaccharide**
- carrots, polysaccharide nonstarch of raw/processed/cooked 1829
- wheat bran/wheat flour, gamma-radiation & polysaccharide from hard red spring 1805
- Pork**
- loin, Zn availability in pork 1901
- particle sizes & preblending hot/cold-boned pork 1902
- Potassium sorbate**
- Neosartorya fischeri*, potassium sorbate & growth of 1786
- Potato**
- moisture/moisture diffusion coeff. measurement in potatoes 1834
- NaCl & osmotic dehydration of potatoes 1833
- patatin purification modified method from potatoes 1835
- peels, dietary fiber composition/hydration capacity in thermally processed 1813
- Solanum tuberosum* cvs, low-temp. sweetening & starch properties of 1832
- Potato starch**
- potato cvs, low-temp. sweetening & starch properties of 1832
- Poultry**
- bone residue, in vitro protein digestibility of dehydrated protein extract from poultry 1906
- Prawn**
- peeling units, quality control in prawn 1915

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rockfish, antioxidants & colour
preservation in 1921

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1759

reducing uniformity in processed
foods 1755

Processing

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Cheddar cheese, protease &
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Proteins animal

poultry bone residue, in vitro
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dehydrated protein extract from
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Proteins milk

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mung bean seeds, UV radiation &
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gamma-radiation & polysaccharide
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vegetables, blanching steam &
cyclohexylamine residue in 1837

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sweet potato starch, sugars &
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Sebastolobus alascanus,
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Rye protein

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Safety

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Salad dressing

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fermented groundnut milk based
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Salmon

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Pacific/great lakes 1922

Salmonella

meat/fish, *Salmonella* detection
in 1890

Salmonella typhimurium

sucrose sol., a_w & S.
typhimurium heat resistance in
1785

Salt

hams, salt level & quality of
cured boneless 1903
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Saponin

fabia bean, saponin analysis
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Seafood

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Sebastolobus alascanus

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Sensory property

beef steaks, binders & sensory
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- properties of 1858
- Sensory quality**
- branding/marketing & perception of sensory quality 1945
- brussels sprouts, storage & sensory quality of 1841
- Sensory research**
- 1946
- Seabania**
- gum/fat/protein source 1814
- Shelf-life**
- fishery products, shelf-life extension of packed 1923
- Shellfish**
- paralytic shellfish poison, thermal degradation of 1914
- Shrimp**
- Penaeus* black discolouration control sodium metabisulphite in tropical raw 1916
- Simmering**
- goat milk, simmering process & physicochemical property changes in 1872
- Skim milk powder**
- sodium caseinate, properties of skim milk powder extrusion produced 1883
- Snack**
- extrusion cooking & production optimization of chickpea snack 1815
- Snapbean**
- blanching steam & cyclohexylamine residue in snapbeans 1837
- Sodium**
- cheese analogs, sodium salts & properties of calcium caseinate based 1875
- foodstuffs, Na detn. in processed 1777
- Sodium ascorbate monophosphate**
- turkeys, sodium monophosphate & off-flavour inhibition in cooked/vacuum-packaged frozen 1908
- Sodium benzoate**
- Neosartorya fischeri*, sodium benzoate & growth of 1786
- Sodium caseinate**
- properties of extrusion produced sodium caseinate 1883
- Sodium chloride**
- cheese, NaCl concn. in 1876
- potatoes, NaCl & osmotic dehydration of 1833
- Sodium erythroate**
- rockfish, sodium erythroate & colour preservation in 1921
- Sodium tripolyphosphate**
- turkeys, sodium tripolyphosphate & off-flavour inhibition in cooked/vacuum-packaged/frozen 1908
- Soy milk**
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- Soy protein**
- protein denaturation & water imbibing capacity of soy protein isolates 1828
- Soy sauce**
- fungi 1782
- Soybean**
- extract, pH & off-flavour control in soybean 1825
- Soybean oil**
- peroxides/carotenoids in soybean oils 1941
- Spectroscopy**
- beef cuts, physical/chemical characteristics NIR spectroscopy detn. in 1900
- Spice**
- temp. & *Listeria monocytogenes* sensitivity to spices 1944
- Spinach**
- leaves, ethylene & quality of processed spinach 1853
- Spoilage**
- tomatoes, *Bacillus* aciduric/pH-elevating & spoilage of underprocessed 1846
- yeast 1787
- Squash seed oil**
- peroxides/carotenoids in squash seed oils 1941
- Stability**
- beef longissimus muscle, vitamins & colour/lipid stability in 1899
- beef muscle, mitochondrial activity & colour stability of 1896
- beef roasts, processing ingredients & oxidative/textural stability of restructured 1897
- beef steaks, binders & colour stability of frozen stored restructured 1895
- breadfruit chips 1855
- butter, BHA/BHT stability & clarification of 1878
- canola oils, ascorbyl palmitate & storage stability of 1942
- Stabilization**
- orange juice/orange juice concentrate, pectin methylesterase & stabilization of 1934
- rice bran, stabilization of 1799
- Staling**
- bread, staling & structural damage detection in 1862
- Starch**
- bread baking, starch gelatinization in chemically leavened 1864
- pasta cooking, starch gelatinization in pasta 1868
- Storage**
- butter, BHA/BHT stability & storage of 1878
- canola oils, ascorbyl palmitate & storage stability of 1942
- eggs, storage & quality of quail/chicken 1909
- infant formula, physico-chemical changes in stored 1925
- potability/mechanical behaviour of plastic water storage tanks 1767
- strawberry, chitosan coating & storage of fresh 1857
- Storage controlled atmosphere**
- lettuce, storage controlled atm. & microbial changes in shredded iceberg 1845
- Storage frozen**
- beef steaks, binders & colour/colour stability of frozen stored restructured 1895
- dough, frozen storage & baking/rheological properties of 1866
- Storage fruit**
- mangoes, storage temp. & quality of Kensington 1856
- Storage milk**
- sweetened condensed milk, structural changes electron microscopy in stored 1874
- Storage vegetables**
- brussels sprouts, storage & nutritional quality of 1842
- brussels sprouts, storage & quality of 1841
- lettuce, storage controlled atm. & microbial changes in shredded 1845
- Strawberry**
- chitosan coating & storage/quality of fresh strawberry 1857
- jams, pectin & volatile compounds/sensory properties of strawberry 1858
- Streptococcus faecalis**
- Laben Rayeb*, Str. faecalis growth in 1871
- Sucrose**
- fruit flavours, sucrose &

- modification of 1854
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- Sugar**
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- Sulphur dioxide**
Neosartorya fischeri, SO_2 &
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- Surimi**
menhaden surimi, Clostridium
botulinum spores incidence/heat
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- Sweet potato starch**
sugars &
gelatinization/retrogradation of
sweet potato starch 1836
- Sweetening**
potato cvs, low-temp. sweetening
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tuberosum 1832
- Sweetness**
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- Taxodium distichum**
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- Tea**
Camellia sinensis, quality
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- Technology**
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- Tempeh**
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- Tephrosia**
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- Tetrachloroethylene**
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- Texture**
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firmer-textured canned tropical
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- Theaflavin**
tea, theaflavins seasonal
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- Thearubigin**
tea, thearubigins seasonal
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- Thermal degradation**
shellfish poison, thermal
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- Thysanolaena maxima**
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- Tocopherol**
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- Tofu**
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- Tomato**
Bacillus aciduric/pH-elevating &
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tomatoes 1846
- Tomato juice**
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- Tortilla**
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- Trichloroethylene**
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in 1939
- Tumbling**
hams, tumbling & quality of cured
boneless 1903
- Turkey**
sodium tripolyphosphate/sodium
ascorbate monophosphate &
off-flavour inhibition in
cooked/vacuum-packaged/frozen
turkeys 1908
- Ultra violet**
mung bean seeds, UV radiation &
nutritional quality of 1819
- Ultrafiltration**
pineapple juice processing,
ultrafiltration membrane for 1935
protein deamidation,
ultrafiltration &
peptidoglutaminase in 1953
- Uricogenicity**
foods, uricogenic potential of
processed 1950
- Vegetable**
blanching steam & cyclohexylamine
residue in vegetables 1837
enzymes & respiration model for
fresh vegetables 1762
firmer-textured canned/frozen
tropical vegetables 1852
maceration enzymatic detn. in
vegetables 1848
physiological activities of
partially processed vegetables
1849
- Vegetable product**
processed vegetable products 1850
- Vegetables**
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- Vicilin**
rheological/microstructural
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networks from vicilin 1910
- Vigna radiata**
see Mung bean
- Viscosity**
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- Vitamin C**
beef longissimus muscle, vitamin
C & colour/lipid stability in
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- Vitamin E**
beef longissimus muscle, vitamin
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- Volatile compound**
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volatile compounds of 1858
- Water**
whey proteins, water association
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- Water activity**
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- Wheat**
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Chopin-Dubois/modified Buhler
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wheat distiller's grains 1803
dough, navy bean flour grade &
rheology/microstructure of wheat
1867
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grain 1801
stillages, soluble/insoluble
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wheat 1809
- Wheat bran**
gamma-radiation & polysaccharide
of hard red spring wheat bran

1805

Wheat flour

gamma-radiation & polysaccharide
of hard red spring wheat flour
1805
wheat protein, flour differences
& solubility rate of 1808

Wheat protein

flour differences & solubility
rate of wheat protein 1808
germ proteins, nutritive value of
lysine supplemented wheat 1807
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milling/separation from wheat
distiller's grains 1803

Whey

lactose manufacture from whey
1870

Whey protein

water association NMR detn. with
whey proteins 1884

Wine

alcoholic fermentation in wines
1928
rice wine fungi 1782

Yeast

beer production, yeast reactor
immobilized for 1927
Candida/Saccharomyces, viability
in frozen wheat dough 1806

Saccharomyces, strain improvement
protoplast fusion technique in
1788

spillage yeast 1787

Yeasts brewing

1782

Yeasts toddy

1782

Yersinia enterocolitica

meat/milk, Y. enterocolitica
isolation from 1891

Yoghurt

1885

Zinc

pork loin, Zn availability in 1901

GENERAL

1956

Venkataraman (LV). **Food prospects in India by the turn of the century.** *Current Science* 63(1): 1992: 20-25

The present production status along with the per capita available and the requirement in 2000 A.D. of the following food items have been described: cereals and pulses; oilseeds; fruits and vegetables; plantation crops especially spices, and beverages; and meat and its products including poultry and fish. The food grains losses in the field and in storage are discussed and the future approach for safe and biodegradable pesticides are indicated. The future role of biotechnology in finding solution to the food problem is stressed. The manufacture of processed food in India is only 1.0% and it is strongly recommended to increase this level. KAR

1957

Gehlawat (JK). **Wealth from effluents of agro-based industries.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 1-15; 1991

Effluents should not be considered as waste materials but with suitable processing could be converted into useful materials. The paper covers aspects like general methods of processing effluents; recovery of constituents from effluent streams; methods of isolation, concn. and purification of components; physical, chemical and biochemical methods in conversions; effluents used for enhanced regeneration of raw materials; and the use of effluents in biotechnological process industries. GS

FOOD PROCESSING

Nil

FOOD PACKAGING

Packaging materials

1958

Kumar (KR) and Balasubrahmanyam (N). **Water vapour transmission rates of multi-layer flexible packaging materials.** *Journal of Food Science and Technology (India)* 29(4): 1992: 237-238

Water vapour transmission rate values of co-extruded films having different webs and laminates at conditions of 38 plus or minus 1 C with 90 plus or minus 2% rh and 27 plus or minus 1 C and 65 plus or minus 2% rh indicated a linear relationship between rh and WVTR for LDPE while hydrophilic polyamide containing composites indicated dependence on rh. The water vapour transmission rate of multi-layer films containing polyamide as the core layer ranged between 4.1 and 5.4 g/m².day at 38 plus or minus 1 C and 90 plus or minus 2% rh, while monofilms of polyolefins had values between 1.9 and 3.0 g/m².day. AS

FOOD ENGINEERING AND EQUIPMENT

1959

Azuara (E), Beristain (CI) and Garcia (HS). **Development of a mathematical model to predict kinetics of osmotic dehydration.** *Journal of Food Science and Technology (India)* 29(4): 1992: 239-242

A mathematical model based on mass balances to study the kinetics for osmotic dehydration was developed. The equation is useful for any geometrical configuration and was tested using published data on apple, beef and pineapple. In all cases of relatively short time exp., good predictions were obtained for long drying times until equilibrium was reached. AS

1960

Wang (J), Wolfe (RR) and Hayakawa (K-I). **Thermal process lethality variability in conduction-heated foods.** *Journal of Food Science* 56(5): 1991: 1424-1428

No single method is available to estimate the variability of thermal process lethality (W_{Fp}) as a function of all thermal process parameters which significantly influence W_{Fp} . Therefore, work was conducted to develop such a method. This was accomplished through screening and regression simulations/analyses. From 19 independent parameters, 12 significant ones were selected through the analysis. The selected parameters included means of slope index of heating curve (f_h), heating medium temp., and slope index of thermal death time curve (z), and the coeff. variations of f_h and z . A polynomial regression equation was developed for estimating W_{Fp} as a function of all parameters found significant through the regression simulation/analysis. The equation was validated experimentally. AS

1981

Tsukada (T), Sakai (N) and Hayakawa (K-I). **Computerized model for strain-stress analysis of food undergoing simultaneous heat and mass transfer.** *Journal of Food Science* 56(5); 1991: 1438-1445

A computerized method was developed for simulating transient state heat and moisture transfer and stress distribution in axisymmetric food undergoing drying process. For this development, a simultaneous heat and moisture transfer model was coupled with the virtual work principle applicable to a body undergoing volumetric changes. The developed method was verified by comparing experimental results with those predicted. Experimental results were obtained by drying cylindrically formed samples of hydrated starch granules. They included central temp., average concn. histories and photographically observed internal crack formations. AS

1962

Lee (JE) and Singh (RK). **Scraped surface heat exchanger orientation influence on particle residence time distributions.** *Journal of Food Science* 56(5); 1991: 1446-1447

Four levels of particle concn. for an "Interaction" exp. and three levels of carboxymethyl cellulose concn., flow rate, mutator speed and particle size were used for a "Tracer Only" exp. to determine particle residence times in horizontal and vertical scraped surface heat exchangers (SSHEs). Min. normalized particle residence time (NPRT) was not significantly affected by SSHE orientation in either type in the exp. However, max. NPRT was significantly higher with vertical SSHE except in the "Tracer Only" exp. Average particles travelled faster than average bulk fluid with less deviation in horizontal SSHE whereas mean particle velocity was less than average bulk fluid velocity and had greater deviation in vertical SSHE. AS

1963

Vyas (HK), Shah (CM) and Shah (US). **Different forms of corrosion in stainless steels and preventive measures.** *Indian Dairyman* 44(4); 1992: 193-202

In stainless steel, general corrosion and localised corrosion are commonly observed. The basic requirement for corrosion to take place in stainless steel material, the characteristics of general corrosion and its prevention are described. In localised corrosion, pitting, crevice corrosion, erosion corrosion, cavitation corrosion, intergranular corrosion, stress corrosion cracking are different types, the characteristics of each one is

described along with the preventive measures. Galvanic corrosion, which happens between two dissimilar metals is also described and the preventive measures are listed. GS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

1964

Gopala Krishna (AG). **Influence of water activity on autoxidation of methyl linoleate during storage.** *Journal of Food Science and Technology (India)* 29(4); 1992: 252-253

Peroxide and total carbonyl values showed no noticeable difference at 0.02 and 0.91 a_w . Anisidine value and polymer content were appreciably higher at $a_w = 0.91$. The results showed that the development of hydroperoxides and their subsequent secondary reactions were influenced to a considerable extent at high a_w . AS

1965

Mulvihill (DM), Rector (D) and Kinsella (JE). **Mercaptoethanol, N-ethylmaleimide, propylene glycol and urea effects on rheological properties of thermally induced β -lactoglobulin gels at alkaline pH.** *Journal of Food Science* 56(5); 1991: 1338-1341

1966

Graham (HD). **Isolation of gellan gum from foods by use of monovalent cations.** *Journal of Food Science* 56(5); 1991: 1342-1346

Gellan gum added to foods was recovered by precipitation with 2M NaCl. The precipitate was trapped on glass wool, washed with 1M salt sol. and eluted with boiling 40% H_2SO_4 or boiling $2 \times 10^{-4}N$ NaOH. Elution with the dilute NaOH was as effective as use of 40% H_2SO_4 , except with dog food, mayonnaise and salad dressing. The hydrocolloid content of the eluate was determined by the carbazole test. Recoveries from milk, beverages, salad dressing and other foods ranged from 75 - 94% (reproducibility 2-4%). The preferred cations for precipitation were $Na^+ > K^+ > Li^+ > NH_4^+$. For the anions, the order was $CO_3^- > SO_4^- > Cl^-$. AS

1967

Hernandez (E) and Baker (RA). **Candelilla wax emulsion, preparation and stability.** *Journal of Food Science* 56(5); 1991: 1382-1383, 1387

Wax in water emulsions were prepared with candelilla wax using a modified conventional method of high pressure homogenization for foods. The resulting emulsions were compared to coconut oil-in-water emulsions. A model based on spectra absorbance analysis was used to evaluate creaming rates of wax-in-water emulsions as well as coconut oil-in-water emulsions, prepared at different homogenization pressures. Creaming rates for wax-in-water emulsion were lower than for oil-in-water emulsion. Wax-in-water emulsions prepared at 4100 kPa produced suspended globules of 1.89 μm in size; emulsions prepared at higher homogenization pressures produced smaller average particle sizes, i.e., 0.66 μm at 27560 kPa. AS

1968

Arora (DK), Hansen (AP) and Armagost (MS). **Sorption of flavour compounds by low density polyethylene film.** *Journal of Food Science* 56(5); 1991: 1421-1423

The interactions of aldehydes, methyl ketones, methyl esters, S compounds and alkylpyrazines with LDPE film were investigated. LDPE film, suspended on a stainless steel support, was immersed in simulated milk ultrafiltrate containing a flavour compound. After shaking the glass bottles containing the sol. and film samples for 24 h at room temp. (24 plus or minus 2 C), the flavour compound was extracted from both the LDPE samples and the $\text{S}_{\mu\text{F}}$, and quantitated using GC. The sorption was: aldehydes ($\text{C}_7 - \text{C}_{10}$) 11% to 63%, methyl ketones ($\text{C}_7 - \text{C}_{10}$) 1.5% to 43.0%, methyl esters ($\text{C}_7 - \text{C}_9$) 6.0% to 42.0%, and S compounds 8.5% to 21%. Insignificant levels of alkylpyrazines were sorbed. For all flavour compound classes, as carbon chain length increased, the quantity of sorbed flavour compounds increased. AS

Chemistry (Analytical)

1969

Prabhakara Raju (RV) and Raghava Naidu (R). **A new spectrophotometric method for the determination of fenvalerate (synthetic pyrethroid).** *Journal of Food Science and Technology (India)* 29(4); 1992: 260-261

A new spectrophotometric method, developed for the detn. of fenvalerate (cyano (3-phenoxyphenyl) methyl 4-chloro- α -(1-methyl ethyl) benzene acetate (51630-58-1), involves the hydrolysis of fenvalerate

under alkaline conditions and the coupling of liberated aldehyde with 2,4-dinitrophenylhydrazine to yield a chromophore ($\lambda_{\text{max}} = 465 \text{ nm}$). Beer's law is obeyed in the range 0.1 - 3.0 p.p.m. The method is sensitive (Sandell sensitivity = 0.0048) and it could be successfully used for the detn. of fenvalerate in water sources and formulations. AS

1970

Sapp (RE) and Davidson (SD). **Microwave digestion of multi-component foods for sodium analysis by atomic absorption spectrometry.** *Journal of Food Science* 56(5); 1991: 1412-1414

Microwave digestion of a variety of low-Na dinners was evaluated for determining Na content. Dinners containing a meat, vegetable and dessert portion were blended, digested with strong acid in the microwave oven, and read by atomic absorption. Na values were compared with those obtained by an FDA method. Also, a Na standard of known concn. was added to some samples, and the recoveries measured for two different amounts added. Reproducibility of microwave digestion was tested on replicates analyzed on the same day, on consecutive days and on consecutive wks. Of the 10 dinner types tested no matrix effects or interferences were noted, and it was concluded that the microwave digestion is a rapid means of preparing a complex matrix such as a frozen dinner for Na analysis. AS

FOOD MICROBIOLOGY AND HYGIENE

Microorganisms

Bacteria

1971

Styles (MF), Hoover (DG) and Farkas (DF). **Response of *Listeria monocytogenes* and *Vibrio parahaemolyticus* to high hydrostatic pressure.** *Journal of Food Science* 56(5); 1991: 1404-1407

Listeria monocytogenes Scott A and CA, were subjected at 23 C to hydrostatic pressures ranging from 2,380 to 3,400 atm and *Vibrio parahaemolyticus* T-3765-1 from 680 to 1,700 atm. For *L. monocytogenes* Scott A, pressurization in ultra-high temp.-processed (UHT) milk and raw milk appeared to provide a protective effect and lessened cell death as compared to pressurization in phosphate-buffered saline (100 mM, pH 7.0). A population of about 10^6 CFU/mL *L. monocytogenes* was killed by exposure to 3,400 atm within 80 min at 23 C in UHT milk. A population of about 10^6 CFU/mL *V. parahaemolyticus* was killed by

exposure to 1,700 atm within 10 min at 23 C in clam juice. AS

1972

Zechman (LG) and Pflug (IJ). **Bacillus stearothermophilus** spore recovery altered by media concentration and formulation. *Journal of Food Science* 56(5): 1991: 1408-1411, 1414

Bacillus stearothermophilus spores, subjected to a range of heating times and temp. were recovered using dextrose tryptone agar and soybean casein digest agar, with and without additives, at normal and reduced concn. Results showed that a reduction in medium concn. increased recovery of heat-stressed spores. The heated spores were inhibited by 0.5% (w/v) NaCl, based on increased recovery using 1.0 TS (1.5% tryptone and 0.5% soytone) compared to 1.0 TSN (0.15% tryptone, 0.05% soytone and 0.05% NaCl). Considering the various media tested variations of tryptic soy agar (TSA) at 0.1 of manufacturers' recommended concn. resulted in increased numbers of recovered spores. Greatest recovery was obtained using 0.1 TSA, 0.1 TSAS (TSA with starch) and 0.1 TSABS (TSA with dextrose, dipotassium phosphate and starch) with none being significantly better. SRA

Lactococcus lactis

1973

Libudzisz (Z) and Galewska (E). **Citrate metabolism in *Lactococcus lactis* subsp. *lactis* var. *diacetylactis* strains.** *Die Nahrung* 35(6): 1991: 611-618

The formation of diacetyl, acetoin, 2,3-butylene glycol, acetaldehyde, ethanol and lactic acid during 24 h of cultivation in milk with 0.19 and 0.5% of citrate has been studied. Depending on the strain, bacteria produced 1.5 - 1.9 mg of diacetyl, 212 - 311 mg of acetoin and 137 - 156 mg of butylene glycol in 1 l milk. An increase of the citrate concn. in milk to 0.5% resulted in an increase in the production of diacetyl from 58 to 74% and of acetoin by 2.8 - 3.7 times. The strains of distinct activity of acetoin reductase produced in these conditions 2.3 - 2.7 times as much as 2,3-butylene glycol. The recovery of citrate in the form of C₄-compounds ranged from 76 to 98%, yet barely 0.18 - 0.44% in the form of diacetyl. Increased concn. of citrate in milk stimulated the production of diacetyl and acetaldehyde to the similar extent, thereby it did not result in the deterioration of organoleptic qualities of starters and milk products. Within the doses used citrate did not significantly affect growth and acidifying activity of the bacteria. AS

Fungi

Mucor miehei

1974

Bhirud (VS), Subrahmanyam (VVR) and Vaidya (SD). **Influence of reaction media on esterification catalysed by *Mucor miehei* lipase.** *Journal of the Oil Technologists Association of India* 23(3): 1991: 44-47

During the lipase catalysed esterification, partial removal of water from reaction media by applying vacuum, either intermittently or continuously, is essential to get high degree of conversion. High free fatty acid (FFA) containing rice bran oil can be esterified with added glycerol to produce oil with low FFA by reducing the concn. of water in the reaction media, but in presence of chlorinated solvents, product having over 55% 1-monoglycerides is obtained. SRA

1975

Bhirud (VS), Subrahmanyam (VVR) and Vaidya (SD). **Alkylation of primary amines with fatty alcohols using immobilized *Mucor miehei* lipase as catalyst.** *Journal of the Oil Technologists Association of India* 23(3): 1991: 47-48

Stearyl amine, which has 94.3% primary amines, after reacting with octyl-, decyl-, lauryl-, and myristyl alcohol for 96 h were lowered to 59.0, 54.4, 39.98 and 19.3% respectively and the corresponding secondary amine contents were 32.3, 38.0, 51.12 and 40.9% respectively. With myristyl alcohol, 35.0% of tertiary amine was formed while it was < 6% for the other three alcohols. Using immobilized *Mucor miehei* lipase, as catalyst, asymmetric tertiary amine could be produced as done with myristyl alcohol. Alkylation was neither affected by excess use of alcohol nor by the batch size. It is concluded that *Mucor miehei* lipase can be used for alkylation of amines, and asymmetric secondary amines of high degree purity could be produced when the products are subjected to vacuum fractional distillation. KAR

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

1976

Suresh (P), Ingle (VK) and Vijayalakshmi (V). **Antibacterial activity of eugenol in comparison with other antibiotics.** *Journal of Food Science and Technology (India)* 29(4): 1992; 254-256

The antibacterial activity of eugenol was tested and compared with that of various antibiotics of known concn. against several Gram positive and Gram negative microorganisms. The results showed that eugenol possessed property of inhibiting the growth of microorganisms *in vitro* at a concn. of 5 g per assay. It was found to be sensitive against organisms like *Escherichia coli*, *Enterobacter sakazaki* and *Klebsiella pneumoniae* which were resistant to antibiotics like Ampicillin, Erythromycin and Sulphamethizole. AS

Antioxidants

1977

Economou (KD), Oreopoulou (V) and Thomopoulos (CD). **Antioxidant activity of some plant extracts of the family Labiatae.** *Journal of the American Oil Chemist's Society* 68(2): 1991; 109-113

The antioxidant activities of methanol extracts of oregano, dittany, thyme, marjoram, spearmint, lavender and basil were tested in lard stored at 75 C. The concn. of extracts in lard varied from 0.01 to 0.20%. Oregano extract was found to be the most effective in stabilizing lard, followed by thyme, dittany, marjoram and lavender extracts, in decreasing order. The induction period of lard increased with antioxidant concn. After the induction period, peroxide formation proceeded rapidly, following pseudo-zero order reaction kinetics. The rate of the reaction decreased slightly with increasing plant extract concn. Combined addition of plant extracts in lard showed a low synergistic action between thyme extract and spearmint extract. AS

1978

Kashima (M), Cha (G-S), Isoda (Y), Hirano (J) and Miyazawa (T). **The antioxidant effects of phospholipids on perilla oil.** *Journal of the American Oil Chemist's Society* 68(2): 1991; 119-122

Antioxidant effect of phospholipids on the oxidation of refined perilla oil (PO; α - 18:3, 54.5%; 16:0, 7.2%; 18:0, 2.6%; 18:1, 18.6%; 18:2, 15.5%, tocopherol-free (POF) and tocopherol-enriched (POR) perilla oil were investigated by measuring wt.-gains and by the oven test at 37 C. The oxidative

stability of PO was especially increased by additions of phosphatidylethanolamine (PE) and phosphatidylserine (PS), but phosphatidylcholine (PC) scarcely showed an antioxidant effect. The oxidative stability of POF was markedly low, and none of the phospholipids (PC, PE, PS) showed an antioxidant effect on the oxidation of POF. The stability of POR was lower than that of PO regardless of its higher tocopherol contents. However, the oxidation of POR was significantly suppressed by additions of PE and PS, as was observed with PO. PC showed a small antioxidant effect on the oxidation of POR. Therefore, it seems that the antioxidant effects of phospholipids, especially of PE and PS, was due to the presence of tocopherols in the perilla oil. AS

1979

Chimi (H), Cillard (J), Cillard (P) and Rahmani (M). **Peroxy and hydroxyl radical scavenging activity of some natural phenolic antioxidants.** *Journal of the American Oil Chemist's Society* 68(5): 1991; 307-312

The autoxidation of linoleic acid dispersed in an aqueous media and the antioxidant effect of hydroxytyrosol, oleuropein, caffeic acid and tyrosol were studied. Linoleic acid autoxidation rate was estimated by the increase of conjugated diene level and by the decrease of linoleic acid content in the samples. The phenolic compounds exhibited an antioxidant activity which increased in the order: tyrosol < caffeic acid < oleuropein < hydroxytyrosol. The analysis of the hydroperoxide isomers pointed out that hydroxytyrosol, oleuropein and caffeic acid at a concn. of 10^{-4} M inhibited the formation of *trans-trans* isomers in the increasing order: caffeic acid < oleuropein < hydroxytyrosol. This inhibition could be related to the ability of phenolic compounds to scavenge peroxy radical. Tyrosol did not inhibit the formation of *trans-trans* isomers. Phenolic compounds were degraded as a consequence of their antioxidant activity and their degradation rate was positively correlated to their antioxidant efficacy. These phenolic compounds, at a concn. of 6×10^{-3} M, also scavenged hydroxyl radical, with an efficiency which increased in the order: tyrosol < hydroxytyrosol < oleuropein < caffeic acid. Polar substituents at the para position, such as in caffeic acid and oleuropein, were correlated with higher hydroxyl radical quenching ability. AS

Colourants

1980

Lauro (GJ). **A primer on natural colours.** *Cereal Foods World* 36(11): 1991; 949-953

Annatto, turmeric, beet juice, paprika, cochineal/carmine, grape skin extract and caramel are the colourants covered in this article. BV

1981

Sudhir Singh and Khanna (SK). **Toxicological evaluation of non-permitted food colours - a review.** *Indian Dalryman* 44(4); 1992: 189-192

Toxicity produced by non-permitted food colours such as Auramine (C.I. Basic yellow 2), Blue VRS (CI Feed Blue 3), Malachite green (C.I. Basic green 4), Metanil yellow (C.I. Acid yellow 36), Orange II (C.I. Acid orange 7), Rhodamine B (C.I. Food red 15) are reviewed. 25 references. GS

CEREALS

1982

Sandberg (A-S) and Svanberg (U). **Phytate hydrolysis by phytase in cereals: Effects on in vitro estimation of iron availability.** *Journal of Food Science* 56(5); 1991: 1330-1333

Wheat bran and whole meal flours of rye and oats were soaked at optimal conditions for phytate activity (55 C, pH 5) for different time intervals. Phytate and its degradation products were determined by HPLC and related to Fe solubility under simulated physiological conditions. Small amounts of phytate ($< 1 \mu\text{mol/g}$) had a strong negative effect on Fe solubility. When inositol hexa- and pentaphosphates of wheat bran and rye flour were completely hydrolysed by activating endogenous phytase, Fe solubility under simulated physiological conditions increased from 3 to 53% (wheat) and 5 to 21% (rye). Addition of wheat phytase to uncooked oatmeal increased Fe solubility from 4 to 11 and in precooked to 18%, while endogenous phytase of uncooked oatmeal had less effect on phytase digestion and Fe solubility. SRA

Rice

1983

James (J). **Rice-husk-ash cement - A review.** *Journal of Scientific and Industrial Research* 51(5); 1992: 383-393

The use of silica from rice-husk for the production of various materials, including rice-husk ash-lime binder has gained significance. In this context, potential uses of husk, nature of silica in husk, thermal degradation of husk, crystallization of silica in husk, physicochemical properties of silica ash; reactivity of silica in ash; reaction product in ash-lime-water system; kinetics and mechanism of

ash-lime reaction; processes for producing lime-rice-husk ash cement; performance of rice-husk ash cement; hydration chemistry of rice-husk ash cement and the optimum ash/lime ratio for getting good performance of ash-lime cement have been reviewed. 107 references. KAR

1984

Semwal (AD) and Arya (SS). **Effect of spices and salt on the storage stability of precooked dehydrated rice.** *Journal of Food Science and Technology (India)* 29(4); 1992: 210-213

Effect of 19 spices (1%), NaCl (0.5 - 2%) and transition metal ions (Fe^{++} , Cu^{++} , Co^{++} , Ni^{++} each at 5, 50 and 500 p.p.m.) on the storage stability of pre-cooked, dehydrated rice processed using refined sunflower oil and vanaspati was investigated. All the spices except *Tejpat* (*Cinnamomum tamala*) exhibited antioxygenic activity in dehydrated rice as well as pure sunflower oil and vanaspati. Red chilli, clove mace and nutmeg exhibited max. antioxygenic activity. *Tejpat*, on the other hand, exhibited pro-oxygenic activity in all the systems. In dehydrated rice, NaCl exhibited slight pro-oxygenic activity but Cu^{++} , Fe^{++} and Co^{++} exhibited very strong pro-oxygenic activity. Only at 500 p.p.m. level Ni^{++} exhibited marginal antioxygenic activity. Nature of the oil used during processing also significantly influenced the stability of dehydrated rice and antioxygenic or pro-oxygenic activity of the spices and metal ions. AS

1985

Hamaker (BR), Griffin (VK) and Moldenhauer (KAK). **Potential influence of a starch granule-associated protein on cooked rice stickiness.** *Journal of Food Science* 56(5); 1991: 1327-1329, 1346

The amount of a 60 Kdal starch granule-associated protein, or waxy gene product, found in milled white rice was examined in relation to cooked rice stickiness. For 32 rice selections the correlation coeff. was similar though slightly lower for the 60 Kdal protein and stickiness ($r = -0.85$, $P < 0.01$) compared to amylose and stickiness ($r = -0.87$, $P < 0.01$). The 60 Kdal protein content correlated highly with amylose content ($r = 0.96$, $P < 0.01$), suggesting a more clear association between amylose and texture. The gelatinization properties of the starch granule may be influenced by the relative amount of granule-associated protein. SRA

Wheat

1986

Syed (HM), Indoni (SB), Annapure (SG) and Bodhankar (SS). **Physico-chemical**

characteristics of Indian wheats - a review. *Indian Miller* 22(5); 1992; 27-31

A brief review covers physical parameters, protein content, gluten content and mineral content of the Indian wheat. 36 references. SRA

Wheat flour

1987

Indrani (D) and Venkateswara Rao (G). **Effect of milling methods on the chemical, rheological and breadmaking characteristics of whole wheat flour.** *Journal of Food Science and Technology (India)* 29(4); 1992; 218-220

Whole wheat flour obtained by milling wheat in hammer, disc, stone and roller mills showed considerable variation in particle size distribution. The damaged starch content and diastatic activity ranged from 10.7 to 21.2% and from 187 to 380 mg of maltose/10g of flour respectively thereby reflecting variation in degree of severity of grinding in different mills. The dough raising capacity was also affected with the values ranging between 53.4 and 79.6%. The dough properties of flours showed considerable variation and the water absorption varied from 64.9 to 72.6%. Bread samples prepared from hammer and roller milled flours were better in quality than those from disc and stone milled flours. AS

MILLETS

Corn

1988

Sinha (R) and Sharada (D). **Chemical characteristics of maize grains and their relationship to roti quality.** *Journal of Food Science and Technology (India)* 29(4); 1992; 243-245

Protein, starch and sugar contents were found to decrease upon alkali treatment of maize grains in contrast to increase in amylose and ash contents. Untreated *rotis* of all var. were found significantly more acceptable than treated *rotis*. Significant correlation of protein, starch and total sugars with *roti* qualities was identified. AS

Corn flour

1989

Huang (CJ) and Zayas (JF). **Phenolic acid contributions to taste characteristics of corn**

germ protein flour products. *Journal of Food Science* 56(5); 1991; 1308-1310, 1315

Corn germ protein flour (CGPF) was subjected to three treatments (ethanol-washing, heat treatment and acid-washing) to remove phenolic compounds. Eight phenolic acids in the extracts of CGPF samples were identified and quantified by GC. *o*-Coumaric, *p*-coumaric, and ferulic acids were the principal phenolic acids in the free and soluble ester fractions of CGPF products. Taste thresholds for the acids were 20, 48 and 90 p.p.m., respectively. Treatments generally improved sensory properties, but acid washing increased sour scores. SRA

Sorghum

1990

Subramanian (V), Seetharama (N), Jabunathan (R) and Venkateswara Rao (P). **Evaluation of protein quality of sorghum (*Sorghum bicolor* (L.) Moench).** *Journal of Agricultural and Food Chemistry* 38(6); 1990; 1344-1347

PULSES

1991

Idouraine (A), Yensen (SB) and Weber (CW). **Tepary bean flour, albumin and globulin fractions functional properties compared with soy protein isolate.** *Journal of Food Science* 56(5); 1991; 1316-1318, 1326

The tepary bean flour (TF) and tepary proteins had good functional properties. Teparies albumin (TA) and teparies globulin (TG) showed high protein solubility at acid and alkaline pH ranges and a low solubility at pH 4 and pH 5-6, respectively compared to soy protein isolate (SPI). Viscosity of both fractions was similar and markedly lower than that of SPI. Heating to 60 C increased viscosity in all, except in TG where it decreased. Heat coagulability and foaming properties was high in TA and TF. TG did not coagulate upon heating to 100 C. TG also formed a weaker and less stable foam and showed lower emulsion capacity than TF, TA and SPI. Oil absorption capacity was excellent to good in TA and TG fractions. SRA

1992

Vidal-Valverde (C) and Frias (J). **Legume processing effects on dietary fiber components.** *Journal of Food Science* 56(5); 1991; 1350-1352

Effects of different processes were studied on neutral detergent fiber (NDF), acid detergent fiber (ADF), hemicellulose (HMC), cellulose (CL) and lignin (LN)

content of legumes. Chickpeas, kidney beans and lentils were soaked and cooked, simulating home processing. Values were recorded on a wet basis as a guide to calculating their contribution to the diet. Normal cooking of chickpeas and kidney beans, led to higher NDF and HMC. LN increased with pressure cooking. The fiber components in lentils did not undergo any significant variation with type of cooking. SRA

Cowpeas

1993

Okechukwu (PE), Rao (MA), Ngoddy (PO) and McWatters (KH). **Thermal processing of cowpea slurries.** *Journal of Food Science* 56(5): 1991: 1302-1307

Simple heating curves were obtained during the heating of slurries containing 15 - 30% cowpea flour. A 10% cowpea slurry at 121 C showed broken heating with two break points, one break due to gelation of protein and starch at 66 C and another due to loss of rigidity at 87 C. The f_{lh} and j_{lh} parameters were independent of particle size of cowpea flour. The difference in F_0 at the can center and the slowest heating point were as much as 29%. SRA

Cowpea flour

1994

Okechukwu (PE), Rao (MA), Ngoddy (PO) and McWatters (KH). **Flow behaviour and gelatinization of cowpea flour and starch dispersions.** *Journal of Food Science* 56(5): 1991: 1311-1315

The flow behaviour of a 25% cowpea slurry with 8% oil held at 70 C showed shear-thinning behaviour and an Arrhenius temp. relationship. Cowpea flour (8%) and starch (2.5%) slurries heated for < 1 min at 70 - 87 C exhibited shear-thickening while those heated longer times exhibited shear-thinning behaviour. Max. viscosities attained due to heat-induced gelatinization showed a power relationship with temp. of heating. Starch gelatinization kinetics followed a first-order equation and the temp. dependence of the rate constant followed the Arrhenius relationship with an activation energy of about 47.5 kcal/mol. Heating the slurries for > 200 min above 80 C resulted in loss of viscosity. AS

Faba beans

1995

Zlena (HM), Youssef (MM) and El-Mahdy (AR). **Amino acid composition and some antinutritional factors of cooked faba beans (Medammis): Effects of cooking temperature and time.** *Journal of Food Science* 56(5): 1991: 1347-1349, 1352

Easy-and hard-to-cook bean seeds were cooked by different heat treatments (100 - 125 C for 1 - 12 h). Amino acid composition, tannins, phytic acid and trypsin inhibitor activity (TIA) were determined. Almost all essential amino acids declined after cooking. Less than 10% of total tannins were decomposed during cooking, while up to 50% were leached to the cooking liquor. Retention of phytic acid in cooked beans was significantly lower than in cooked bean-liquor mixtures. Loss of phytic acid due to leaching was much higher for easy-to-cook beans than for hard-to-cook ones. Apparent retention of TIA amounted to about 50%. Optimum heat treatments were 125 C at 1 h for easy and 120 C at 2 h for hard-to-cook beans. AS

OILSEEDS AND NUTS

Canola

1996

Owusu-Ansah (YJ) and Marianchuk (M). **Microwave inactivation of myrosinase in canola seeds: A pilot plant study.** *Journal of Food Science* 56(5): 1991: 1372-1374, 1406

The study indicates that microwave heating could be used to completely inactivate myrosinase in whole or flaked canola seeds. The parameters for inactivation were exposure time and power. The exposure time needed for enzyme inactivation at a specific power was moisture-dependent. For constant, single processing conditions, moisture content of 10 - 16% and medium to high microwave power appeared ideal. Microwave treatment caused significant increase in the yellow colour and sulphur content of the seed oils. SRA

Groundnuts

1997

Chiou (RY-Y), Shyu (S-L) and Tsai (C-L). **Characterization of gamma-irradiated peanut kernels stored one year under ambient and frozen conditions.** *Journal of Food Science* 56(5): 1991: 1375-1377

γ -Irradiated (at 0, 2.5, 5.0, 10 and 20 kGy) peanuts lost germination capabilities after 1 yr storage. Peanuts irradiated with 2.5 kGy and stored at

ambient temp. contained viable molds. Peanuts oil in kernel stored at -14 C was comparatively more stable than in peanuts stored at ambient temp. Irradiation did not show any effect on oxidation of oil. Fatty acid content varied slightly with exception of linoleic and lenolenic acids which decreased with increased radiation depending on storage temp. Peanut proteins analysed by SDS-PAGE showed no obvious qualitative variation among the samples subjected to various doses of γ -irradiation. SRA

1998

Kim (N-K) and Hung (Y-C). **Mechanical properties and chemical composition of peanuts as affected by harvest date and maturity.** *Journal of Food Science* 56(5); 1991: 1378-1381, 1392

The effects of harvest date and maturity (by the Hull Scrape method) on the mechanical properties and the chemical composition of peanuts and the test hypothesis that peanut mesocarp colour could be used as an index to group peanuts with similar qualities were evaluated. In general, peanut kernels became harder, crisper, crunchier and more brittle at higher DAP's (days after planting) and higher maturity. Moisture content at harvest decreased, protein content remained unchanged and carbohydrates decreased with increasing DAP, harvest dates did not affect oil and ash. Total unsaturated fatty acids content increased with maturity. Qualities of peanuts in orange, brown and black maturity groups were very similar. The larger the portion of peanuts with orange, brown or black mesocarp colour, the higher would be the quality of the particular batch of raw peanuts. SRA

1999

Bhagya (S), Prakash (V) and Srinivasan (KS). **Effect of different proteolytic enzymes on the nature of subunit composition of arachins from groundnut (*Arachis hypogaea* L.).** *Indian Journal of Biochemistry and Biophysics* 29(2); 1992: 154-159

Results of this study indicated that eventhough the gross conformation and other physico-chemical properties of the arachins from 3 different (Spanish improved, TMV-2, and DH-3-30) var. were similar, the hydrolysis of proteins by the 3 proteolytic enzymes differed in their rate as well as extent. This can only be attributed to the nature of acidic and basic subunits of arachins in the 3 var. This is also confirmed by difference in their amino acid composition, especially in tyrosine, glutamic acid, alanine and cysteine, with possible role in the stereo-specificity of the enzymes. SRA

Rapeseeds

Rapeseed proteins

2000

Kroll (J). **Selected functional properties of detoxified rapeseed protein preparations effected by phytic acid.** *Die Nahrung* 35(6); 1991: 619-624

Detoxified rapeseed protein preparations with high protein content (> 90%) produced by extraction, ultra- and diafiltration, have a very good solubility and excellent foaming properties (better than egg white). The emulsifying properties (emulsifying activity and emulsion stability) are moderate. The N-solubility profile of these preparations (albumin and globulin mixing) has been influenced by phytic acid (PA). It is possible to observe a shift of the isoelectric range to lower pH-values and parallel a decrease of solubility if the amount of PA (3, 5, 10%) is increased. The foaming properties have also been dependent on the PA content. A higher concn. of PA (3, 5, 10%) causes a decrease in the foaming activity. The results have been discussed concerning the interactions between PA and proteins. AS

Safflowers

2001

Binder (RG), Benson (ME) and Flath (RA). **Volatile components of safflower.** *Journal of Agricultural and Food Chemistry* 38(5); 1990: 1245-1248

2002

Gupta (RK), Khanna (KR) and Banerji (R). **Variation in fatty acid composition of Indian cultivars of safflower (*Carthamus tinctorius* L.).** *Journal of the Oil Technologists Association of India* 23(3); 1991: 56-57

Fatty acid composition of 37 lines of Indian safflower is reported. The oil content of 15 samples ranged from 24 - 29%; others had > 30% oil content. All the oil samples had palmitic (16:0), oleic (18:1) and linoleic (18:2) acids, as the common fatty acids, while stearic (18:0) was found in only 15 samples. The sum of concn. of oleic and linoleic ranged from 85.42% in S-83 to 94.54% in S-99; the exception being SJ-22 (39.98%). Based on the fatty acid composition, the genotype S-48 was selected as the most promising for developing high oleic acid lines suitable for Indian conditions. SRA

Sesame

2003

Razia Tasneem and Prakash (V). **The nature of the unhydrolysed fraction of Alpha-globulin, the major protein components of *Sesamum indicum* L. hydrolysed by Alpha-chymotrypsin.** *Indian*

Alpha-globulin, the high mol. wt. protein fraction from sesame (*Sesamum indicum* L.) seed, was hydrolysed by α -chymotrypsin. The hydrolysate was resolved into two fractions, the hydrolysed part and the unhydrolysed part of α -globulin using gel filtration on Sepharose 6B-100. The unhydrolysed α -globulin residue was characterized for its sedimentation coeff., subunit composition, fluorescence omission spectrum, secondary structure, and other biophysical properties. The results indicated a decrease in the size of the protein molecule upon hydrolysis to a very small extent. The effect of hydrolysis products on hydrolysis of native α -globulin as well as on a standard substrate, casein, was also investigated. The results indicated that the hydrolysis products contribute to the resistance of α -globulin to proteolysis by α -chymotrypsin to the extent of nearly 40%. AS

Soybeans

2004

Charjan (SKU) and Tarar (JL). **Effect of storage on germination and microflora of soybean (*Glycine max*) seed.** *Indian Journal of Agricultural Sciences* 62(7): 1992; 500-502

Soybean with 9% moisture content was stored in jute, cloth and polyethylene (700 gauge) bags (20 x 30 cm size) for 18 months at 10.6 - 43.4 C and 35.8 - 87.3% rh and observations were recorded for germination and incidence of mycoflora at 6-month intervals. Fungi incidence was max. in soybean stored in cloth and jute bags. Polyethylene bag provided good protection to soybean seeds and prevented the development of fungal colonies both quantitative and sp. wise. With the advancement of storage the incidence of various fungi increased. KAR

2005

Clark (PK) and Snyder (HE). **Hydroperoxide formation in soybean seeds during storage.** *Journal of the American Oil Chemist's Society* 68(5): 1991; 346-347

'Forrest' soybeans were stored for 2 yrs, and the extracted lipids were assayed for hydroperoxide content. The crude lipid was separated by HPLC, and 3 hydroperoxide peaks plus the triglyceride peak were measured every 2 months. There was a lag in hydroperoxide production for the first 9 months followed by a steady increase for the remaining 22 months. This method of measuring changes in lipid oxidation should be useful for

monitoring seed changes in germination and vigor during storage. AS

Soy products

Soy flour

2006

Kulkarni (SD), Wijeratne (WB) and Wei (TM). **Production of medium fat soy flour by dry-extrusion-expelling of raw soybean and its use in bread fortification.** *Journal of Food Science and Technology (India)* 29(4): 1992; 220-223

Dry heat treatment of soybean through dry-extrusion-expelling was used to produce medium fat soy flour. The flour of the cake obtained after expelling the extrudate of coarsely ground soybean contained 3.3 - 5.3% moisture and 7 - 9% oil, while trypsin inhibitor was inactivated to an extent of 35.5 - 46.8%. Soy flour thus obtained was used at 12% flour substitution level for making bread, which was acceptable. AS

2007

Mishra (HN) and Mukherjee (RK). **Storage stability of full-fat soy flour and soy-wheat flour blend.** *Journal of Food Science and Technology (India)* 29(4): 1992; 224-227

Raw full-fat soy flour (RSF), processed full-fat soy flour (FFSF) with and without antioxidant and soy-wheat flour (SWF) blend, stored at different temp. and rh, showed that the temp. and rh had pronounced effect on storage stability of the flours which were found to be more stable at lower temp. and rh ranges than at higher ones. Thermally processed and prepared FFSF had good keeping quality and could be stored safely for more than 4 months either alone or in combination with wheat flour. Addition of antioxidant had little effect in checking peroxide formation of the flour during the later stages of the storage. AS

Soy proteins

2008

Bernardi Don (LS), Pilosof (AMR) and Bartholomai (GB). **Enzymatic modification of soy protein concentrates by fungal and bacterial proteases.** *Journal of the American Oil Chemist's Society* 68(2): 1991; 102-105

Solubility, foaming capacity and foam stability of denatured soy protein concentrate obtained from toasted flour were improved by proteolysis with fungal or bacterial proteases. Emulsifying capacity was unchanged, but emulsion stability decreased;

bacterial protease highly improved oil absorption. Also, the bacterial protease was able to solubilize more protein and gave products which foamed more than those obtained with the fungal enzyme. However, the stabilizing properties of the bacterial modified soy protein concentrate at the air/water or oil/water interface were inferior. By limited hydrolysis up to degree of hydrolysis 10% most functional properties were improved without greatly reducing emulsion stability and water absorption. AS

2009

Kang (JII), Matsumura (Y) and Mori (T). **Characterization of texture and mechanical properties of heat-induced soy protein gels.** *Journal of the American Oil Chemist's Society* 68(5); 1991: 339-345

Heat-set gels were prepared from acid-precipitated soybean proteins at various heating temp. (80 - 100 C), protein concn. (18 - 20%), and proportions of glycinin. The gels were evaluated for mechanical parameters by means of a compression-decompression test. Gels formed at higher heating temp. and protein concn. were firm, tough and unfracturable. The elasticities of gels were similar at all protein concn. and were lower when heated at higher temp. Heating above 93 C was necessary for formation of rigid gels. The glycinin/ β -conglycinin ratio affected the texture of the gels. Three-dimensional representation of the gels through factor analysis of instrumental data and calculation of factor scores was useful to evaluate the texture of the gels. AS

TUBERS AND VEGETABLES

Beet

2010

El-Makhzangy (A), Ayyad (K) and Abo-ElNile (E). **Factors affecting the production of *Saccharomyces cerevisiae* from sugar beet pulp.** *Die Nahrung* 35(6); 1991: 641-654

Factors affecting the production of *S. cerevisiae* from sugar beet pulp after acid hydrolysis were investigated. Max. yield and economic coeff. were obtained at sugar concn. of 7.15% after an incubation period of 72 h at 30 C and pH 6.0 using a mixture (1:1) of ammonium sulphate and ammonium nitrate (0.2 g/g sugar) as nitrogen source. HPLC analysis of beet pulp hydrolyzate showed that hexoses especially glucose serve as the most suitable sugars with regard to *S. cerevisiae* activity. AS

Brassica

2011

Poonam Aggarwal and Saini (SPS). **Chlorophyll losses during preparation, canning and storage of Brassica greens.** *Journal of Food Science and Technology (India)* 29(4); 1992: 258-259

Total chlorophyll content decreased to 80% of its initial value after cooking and canning and to 40 - 50%, during 6 months storage in Brassica greens. 'RLM-240' and 'Brown sarson' retained max. chlorophyll and Chinese cabbage contained min. chlorophyll in fresh, processed as well as stored form among the 5 var. studied. Higher chlorophyll was retained under refrigerated storage. AS

Carrots

2012

Tatsumi (Y), Watada (AE) and Wergin (WP). **Scanning electron microscopy of carrot stick surface to determine cause of white translucent appearance.** *Journal of Food Science* 56(5); 1991: 1357-1359

Carrot sticks that were prepared with a sharp culinary knife exhibited a whitish translucent appearance on the surface. This condition was not readily apparent with carrot sticks sliced with a razor sharp blade. Scanning electron microscopic examination of the translucent tissue revealed that the knife tended to shear, separate and compress the cells and tissues of the root. Dehydration of the large mass of exposed cells probably was responsible for the appearance of the whitish translucent tissue. Development of this condition is undesirable because consumers associate this with aged or nonfresh carrot sticks. AS

Cassava

2013

Badrie (N) and Mellowes (WA). **Effect of extrusion variables on cassava extrudates.** *Journal of Food Science* 56(5); 1991: 1334-1337

Cassava flour was successfully used as feed ingredient in production of a puffed extrudate. The physicochemical characteristics of the extrudate were significantly influenced by feed moisture (FM), temp., screw speed and feed rate (FR). Optimum extrudate expansion (2.82) was obtained at 11% FM; temp., 120 - 125 C; screw speed of 520 r.p.m. with FR 250 g/min. SRA

Cassava flour

2014

Badrie (N) and Mellowes (WA). **Texture and microstructure of cassava (*Manihot esculenta* Crantz) flour extrudate.** *Journal of Food Science* 56(5): 1991: 1319-1322, 1364

Cassava flour (*Manihot esculenta* Crantz) was texturized by single-screw extrusion processing. Relationships between texture and microstructure as a function of extrusion variables were examined. The effect of feed moisture or screw speed was significant ($P < 0.01$) on all textural parameters except springiness and energy first bite. Hardness, gumminess ($P < 0.05$) fracturability and cohesiveness ($P < 0.01$) decreased with increasing temp. Hardness, fracturability and firmness were lowest at screw speed 520 r.p.m. with feed rate 300g/min, 120-125 C and 11% feed moisture. Scanning electron micrographs showed structural change from a coarse cell mass at high feed moisture to a porous, thin-walled structure with decreased feed moisture. AS

Turnips

2015

Shattuck (VI), Kakuda (Y), Shelp (BJ) and Kakuda (N). **Chemical composition of turnip roots stored or intermittently grown at low temperature.** *Journal of the American Society for Horticultural Science* 116(5): 1991: 818-822

Field and greenhouse studies were conducted to investigate the effects of low temp. on the starch, sugar, ascorbic acid, and glucosinolate (GS) concn. in turnip [*Brassica rapa* ssp. *rapifera* (Metzg.) Sinsk] roots. Field-harvested roots were stored at 0 C for 2 and 4 wks. In the greenhouse, plants were grown at 0 to 12 C for parts of 11 days before harvest. Cold-stored roots decreased in both starch and total sugar concn. (sucrose, fructose and glucose) when compared to freshly harvested roots. Greenhouse-grown plants subjected to low temp. had roots with a similar starch content but with a higher concn. of total sugars than the control. In both exp., the cold treatments induced a slight but significant increase in root sucrose concn. The ascorbic acid concn. of roots was not affected by low temp. In both the field and greenhouse studies, low temp. did not change the total concn. of the 8 major GSs identified in peeled root and peel tissues, but did alter the concn. of specific GSs. AS

Asparagus

2013

Baxter (L) and Waters (LJr). **Quality changes in asparagus spears stored in a flow-through CA system or in consumer packages.** *Hortscience* 26(4): 1991: 399-402

Asparagus spears (*Asparagus officinalis* L.) stored 28 days at 2 C in air, a flow-through controlled-atm. (CA) system, or 14 days in polymeric film consumer packages were evaluated in respect to compositional and quality changes. CA-stored spears retained more sugars, organic acids, and soluble proteins than spears stored in air. Spears stored in vented consumer packages had a useful life of 14 days, whereas those in nonvented packages started to break down after 8 days. Spears from vented packages lost more wt. but retained more sugars and organic acids than those from nonvented packages. AS

Potatoes

2017

Saikia (L) and Ranganna (S). **Determination of thermal process schedules for canned drumstick, okra, elephant yam and potato.** *Journal of Food Science and Technology (India)* 29(4): 1992: 203-209

Thermal process schedules have been evolved for canned drumstick, okra, elephant yam and potato using *Clostridium sporogenes* as the test organism. The values of thermal resistance (D) found using approx. 10^3 spores (B) were 1.75 plus or minus 0.21 times the values found using approx. 10^4 spores (A). The sterilisation values (F_0) corresponding to 3.0 min (Botulinum cook), 5D of A, or a value found by integrating D values of A and B concn. of spores did not prevent spoilage of inoculated packs. F_0 of 5.2 and 5.4 min (equal to 5D of B and experimental z) are considered adequate for commercial processing of drumstick and elephant yam respectively. Okra is best canned in acidified form. Potato requires an F_0 of 9.7 min to overcome facultative thermophilic spoilage. A procedure for interconversion of F value corresponding to experimental z value in terms of F_0 value is given. AS

Vegetables

Cucumbers

2018

McDonald (LC), Fleming (HP) and Daeschel (MA). **Acidification effects on microbial populations during initiation of cucumber fermentation.** *Journal of Food Science* 56(5): 1991: 1353-1356, 1359

Addition of acetic acid (0.067M) or calcium acetate (0.133 M) to the cover brine (1.94M NaCl) of cucumbers reduced naturally occurring *Enterobacteriaceae*, but not lactic acid bacteria (LAB), during the first 5 days after brining. Naturally occurring LAB were predominantly heterofermentative (greater than or equal to 80%) 1 day after brining and homofermentative (greater than or equal to 90%) on the 5th day. *Enterobacteriaceae* survived longer within cucumbers than in brine, particularly in nonacidified cucumbers. Starter cultures of *Lactobacillus plantarum* or *Pediococcus pentosaceus* decreased 90 - 99.9% during the first 10 h after addition and did not increase until about 30 h after brining. Obtaining predominant fermentation of brined cucumbers by added cultures was difficult due to presence of natural microflora on/in the cucumbers and the harsh environment of the brine (high salt, low nutrients). AS

Leafy vegetables

Amaranthus

2019

Bressani (R) and Garcia-Vela (LA). **Protein fractions in amaranth grain and their chemical characterization.** *Journal of Agricultural and Food Chemistry* 38(5); 1990: 1205-1209

Pumpkins

2020

Teotia (MS). **Advance in chemistry and technology of pumpkins.** *Indian Food Packer* 46(1); 1992: 9-31

The review covers major aspects like storage, chemistry and technology of pumpkins (*Cucurbita* sp.). Under storage the effect of containers and storage conditions of fertilizers, pretreatments, surface wax and keeping quality and changes taking place during storage of pumpkins are covered. The chemistry of pumpkins and its seed covered are: varietal variation in composition, and nutritional value. Preparation of raw pumpkin for processing, blanching, dehydration, canning, pumpkin beverage, jam preserve, pickle and sauce and such other products, and the utilization of seeds are covered under the technology. 97 references. GS

Tomatoes

2021

Larrigaudiere (C), Latche (A), Pech (JC) and Triantaphylides (C). **Relationship between stress ethylene production induced by gamma-irradiation and ripening of cherry**

tomatoes. *Journal of the American Society for Horticultural Science* 116(6); 1991: 1000-1003

Changes in 1-amino-cyclopropane-1-carboxylic acid (ACC) metabolism induced by γ -irradiation have been studied during ripening of cherry tomatoes (*Lycopersicon esculentum* L. cv. Sweet 100) treated at the mature-green stage. Irradiation caused a sharp and transient dose-dependent increase in ethylene production during the first 24 h that was associated with an increase in ACC synthase activity. The activity of ethylene-forming enzyme (EFE) was also stimulated but was never limiting. Nine days following irradiation, ACC metabolism was more active in irradiated fruits, with ACC being mainly directed to ethylene [80% at 3 kilogray (kGy: 1 Gray = 100 Rad = 1 J.kg⁻¹)] rather than to malonyl ACC (MACC). As a consequence, fruit ripening was accelerated. For doses < 1 kGy, the time required for 50% of the fruits to reach breaker stage (the onset of climacteric ethylene production) was inversely correlated with radiation dose and the amount of stress ethylene produced during the first 24 h. At doses > 1 kGy, in spite of a continuous stimulation of stress ethylene production, no additional acceleration of ripening occurred. At 3- to 5-kGy doses, fruit ripening was impaired transiently with a fast subsequent recovery. As a result, a significant synchronization of fruit ripening (presumed to be caused by enhanced ethylene production) was observed. AS

2022

Dodds (GT), Brown (WJ) and Ludford (PM). **Surface colour changes of tomato and other solanaceous fruit during shilling.** *Journal of the American Society for Horticultural Science* 116(3); 1991: 482-490

Chilling of mature-green (MG) tomato fruit (*Lycopersicon esculentum* Mill. and related sp.) was investigated to determine the effect of chilling stress on surface colour during low-temp. storage. Colour measurements were made with a tristimulus colorimeter (L, a, b values), and data were analyzed by multivariate analysis of variance and canonical variates analysis. Changes in surface colour of MG fruit during chilling were not correlated overall with relative chilling sensitivity of cvs/lines; however, within standard and cherry types, chilling-tolerant fruit changed surface colour more during chilling than chilling-sensitive fruit when fruit were picked early in the season. Early harvests were less chilling-sensitive than late harvests. The number of hrs below 15.6 C in the 200 h before harvest was positively correlated with postharvest chilling sensitivity. A high vs. ambient rh during storage did not affect chilling-induced % change in colour. Tobacco mosaic virus resistance led to less and *Verticillium albo-atrum* Reinke & Berthier resistance

led to more chilling-induced colour change. There was no effect from resistances to *Fusarium oxysporum* Schlechtend f. sp. *lycopersici* (Sacc.) W.C. Snyder and H. N. Hans, alternaria stem canker (*Alternaria solani* Sorauer), anthracnose [*Colletotrichum coccodes* (Wallr.) S. J. Hughes], root-knot nematode (*Meloidogyne hapla* Chitwood), *Phytophthora infestans* (Mont.) deBary, or *Stemphyllium botryosum* f. sp. *lycopersici* Rotem, Cohen, and Wahl. The results show that the harvest date had an effect on chilling-induced changes in surface colour in MG fruit. AS

FRUITS

2023

Carbonell (E), Costell (E) and Duran (L). **Fruit content influence on gel strength of strawberry and peach jams.** *Journal of Food Science* 56(5): 1991: 1384-1387

Influence of fruit content, interaction with final soluble solids and added pectin on gel strength of strawberry and peach jams was studied. Composition ranged 25 - 55%, 60 - 70 °Brix, 0.3 - 0.7% added pectin in strawberry jams and 0.1 - 0.5% in peach jams. Gel strength was measured in a Stevens LFRA texture analyzer. Regression equations showed that in strawberry jams effect of fruit content was quadratic and interaction with soluble solids was weak and negative while in peach jams the same effect was linear and the interaction was strong and positive. No interaction of fruit content with added pectin was observed, showing those effects were independent and additive. AS

Apples

2024

Sud (G), Parmar (C) and Nayital (RK). **Effect of calcium chloride, bavistin and diphenylamine on the shelf-life of apple cv. Royal Delicious.** *Indian Food Packer* 46(1): 1992: 33-38

Apple fruits (var. Royal Delicious) after harvest were dipped in CaCl₂ (2 and 4%) and Bavistin (500 p.p.m.) and in diphenylamine (1000 p.p.m.) sol. for 2 min. CaCl₂ particularly 4% was effective in reducing the loss of fruit firmness and physiological wt., preventing the rot and maintaining the quality during 5 wk of storage at room temp. The shelf-life, which was only 2 wk under control was further extended by another 2 wk and CaCl₂ (4%) proved to be the best treatment. GS

2025

Lau (OL) and Yastremski (R). **Retention of quality of 'Golden Delicious' apples by controlled- and modified-atmosphere storage.** *Hortscience* 26(5): 1991: 564-566

'Golden Delicious' apples (*Malus domestica* Borkh.) were subjected to either 0 C controlled-atm. (CA) storage or to a postharvest coating of 0.1% to 2.5% Nutri-Save (NS) a polysaccharide derived from shellfish plus air storage. NS-coated apples were greener and firmer and had higher titratable acidity (TA) and more shrivelled and injured fruit than the control after storage in air at 0 C for 5 to 6 months and ripening in air at 20 C for 7 days. Poststorage washing increased skin injury, and low rh during ripening increased shriveling of NS fruit. NS applications led to an accumulation of CO₂ and C₂H₄ and a small reduction of O₂ in the fruit core cavities. The use of 1.5% O₂ + 1.5% CO₂ in the storage atm. was more effective than NS plus air storage in maintaining flesh firmness (FF) and TA without increasing fruit shrivel or skin injury. NS treatments maintained FF and a green skin in fruit ripened in air at 20 C for 2 or 4 wks following harvest, but some shrivel was evident by 4 wks. Better retention of skin greenness was the only benefit derived from a poststorage NS treatment of CA-stored fruit during the shelf-life test. AS

2026

Kramer (GF), Wang (CY) and Conway (WS). **Inhibition of softening of polyamine application in 'Golden Delicious' and 'McIntosh' apples.** *Journal of the American Society for Horticultural Science* 116(5): 1991: 813-817

2027

Andrich (G), Fiorentini (R), Tuci (A), Zinnai (A) and Sommovigo (G). **A tentative model to describe the respiration of stored apples.** *Journal of the American Society for Horticultural Science* 116(3): 1991: 478-481

Using mathematical equations that describe the O₂ mass-transfer and the enzymatic oxidation of the organic substrates of apples (*Malus domestica* Borkh.), a kinetic model to correlate fruit respiration rate with environmental O₂ partial pressure (PO₂) was developed. The kinetic detn. were carried out at room temp. using apples stored at 3 to 4 C for 11 to 19 wks. Results show that: 1) the calculated value of the Michaelis-Menten constant related to the enzymatic oxidation of the respiratory substrate ($K_m = 2.1 \text{ plus or minus } 0.5 \cdot 10^{-5} \text{ mol.kg}^{-1}$) is close to that reported in the literature for cytochrome-c oxidase; 2) the located range of PO₂ levels where O₂ becomes the limiting factor in the respiration process (near 2.6 kPa at T = 20.5 plus or minus 1 C)

is close to those usually used on a commercial scale for controlled atm. storage. AS

Avocadoes

2028

Meir (S), Philosoph-Hadas (S), Zauberman (G), Fuchs (Y), Akerman (M), Aharoni (N). **Increased formation of fluorescent lipid-peroxidation products in avocado peels precedes other signs of ripening.** *Journal of the American Society for Horticultural Science* 116(5); 1991: 823-826

Fluorescent products (lipofuscin-like compounds) of lipid peroxidation, which accumulate with age, were extracted from 'Fuerte' avocado (*Persea americana* Mill.) peels during ripening. Fractionation and analysis of these fluorescent compounds (FCs) was carried out by an improved method, based on separation of FCs from chlorophyll by Sep-Pak silica cartridges. A sharp rise in FCs content was found 2 days after harvest in avocado fruits stored at 22 C, and ethylene enhanced this rise 3-fold on the 4th day. The accumulation of FCs preceded by at least 3 days the onset of climacteric ethylene and respiration and by 2 days the decrease in fruit firmness. Moreover, a 6-fold increase in the FCs concn. occurred during 1 to 2 wks of storage at 5 C, but the avocado fruits did not show any other detectable signs of ripening. These results suggest that lipid peroxidation may be regarded as one of the earliest detectable processes occurring during fruit ripening. Thus, an increase of FCs in peel may be employed as a horticultural characteristic for estimating initiation of ripening in avocado fruit. AS

Citrus

2029

Chou (TC), Pintauro (N) and Kokini (JL). **Conformation of citrus pectin using small amplitude oscillatory rheometry.** *Journal of Food Science* 56(5); 1991: 1365-1368, 1371

Conformation of citrus pectin (uronide 93%, degree of esterification, 61.5%) sol. was studied and experimental reduced storage $[G']_R$ and loss moduli $[G'']_R$ were compared with random coil theories of Rouse and Zimm and the rodlike theory of Marvin and McKinney. The theory of Zimm best approximated experimental data. This suggested that components of the pectin molecule internally interact to form a compact random coil with conformation controlled by hydrodynamic interactions. AS

Figs

2030

Pawar (SG), Kulkarni (DN), Shere (DM), Kulkarni (KD) and Patil (VK). **Effect of pretreatments on chemical composition and drying rates of solar dried figs.** *Indian Food Packer* 46(1); 1992: 39-44

Figs (*Ficus carica* L) var. Poona and Daulatabad were dried using solar drier after pretreating with (i) sulphitation, (ii) blanching + sulphitation, (iii) blanching, and (iv) lye treatment. Protein content was not altered by pretreatments. Total and reducing sugars were higher in sulphited Poona fig than in Daulatabad fig. Crude fiber was higher in Daulatabad. The drying rates at the initial stages were similar in all the treatments but at the final stages control and (ii) showed rapid drying rate in the Poona var. In the Daulatabad var., at the final stages of drying, control and (iii) showed faster drying rates. GS

Grapefruits

2031

McDonald (RE), Miller (WR), McCollum (TG) and Eldon Brown (G). **Thiabendazole and imazalil applied at 53 C reduce chilling injury and decay of grapefruit.** *Hortscience* 26(4); 1991: 397-399

The fungicides thiabendazole (TBZ) or imazalil were applied at 1 g.l^{-1} at 24 or 53 C to 'Marsh' and 'Redblush' grapefruit (*Citrus paradisi* Macf.) to reduce fruit susceptibility to chilling injury (CI) and decay. Generally, there was more CI and decay on 'Marsh' grapefruit than on 'Redblush'. Severity of CI was lower in grapefruit that had been dipped at 53 C than at 24 C. Fruit dipped in fungicides had less CI than fruit dipped in water alone. Imazalil was more effective in reducing CI than TBZ. Fungicides reduced decay at both temp., and imazalil was better than TBZ. AS

Grapes

2032

Sharma (PC), Joshi (VK) and Sharma (KD). **Preliminary studies on juice processing suitability of grapes grown under dry temperate conditions.** *Indian Food Packer* 46(1); 1992: 51-54

Juice processing suitability of three var. of grapes, (i) Katta, (ii) Chholtu Red, and (iii) Chholtu White grown under dry temperate conditions were evaluated. A suitable grape juice extraction technique was also standardised. Hot pressing gave better extraction of constituents like tannins, acids, total soluble solids and increased relative viscosity, compared to cold pressing. Clarification with pectolytic enzyme resulted in heavy settling of

sediments comprising fine pulp, tartarates and pectic substances at the bottom thereby improving the colour, body and sugar/acid/astringency blend of the juice. Extraction and clarification methods also affected the sensory qualities of the juices. Chholtu Red and Chholtu White juices were too acidic, astringent and unacceptable while Katta grape juice was superior to others, in colour, body and sugar/acid blend. GS

2033

Prakash (GS), Chadha (KL) and Reddy (BMC). **Changes in the physical and chemical composition of Kniffin trained grapes during ripening.** *Indian Journal of Horticulture* 48(4); 1991: 282-285

Changes in the berry wt., vol. and chemical constituents were determined in Thompson Seedless, Gulabi, Black Champa and Bangalore Blue grapes, trained to 6-arm Kniffin system at weekly interval from Veraison till maturity (January 28 to March 2). Berry wt. and size increased from Veraison till harvest in all cv. except in Bangalore Blue grape. Total soluble solids and its ratio with acids increased steadily from Veraison till maturity. The acid content in the berries decreased steadily after veraison until maturity. SRA

Mangoes

2034

Miller (WR), McDonald (RE) and Sharp (JL). **Quality changes during storage and ripening of "Tommy Atkins" mangoes treated with heated forced air.** *Hortscience* 26(4); 1991: 395-397

Freshly harvested mangoes (*Mangifera indica* L.) treated with forced air at 51.5 C for 125 min then stored for 1, 2, or 3 wks at 12 C, followed by 21 C until soft-ripe, were compared with nontreated fruit for quality changes. Treated fruit lost 1.0% more fresh wt. than nontreated fruit and developed trace amounts of peel pitting. Total soluble solids concn. for treated and nontreated fruit were similar (approx. 13%), as was peel colour at the soft-ripe stage. Treated fruit generally reached the soft-ripe stage approx. 1 day earlier than nontreated fruit regardless of storage duration and had a lower incidence and severity of stem-end rot and anthracnose. The trace of pitting on treated fruit likely will not influence consumer acceptance. AS

Peaches

2035

Nanos (GD) and Mitchell (FG). **Carbon dioxide injury and flesh softening following**

high-temperature conditioning in peaches. *Hortscience* 26(5); 1991: 562-563

High-temp. controlled-atm. (high CO₂/low O₂) conditioning was investigated as a possible treatment to delay the incidence of internal breakdown of peaches and nectarines (*Prunus persica* L. Batsch) during subsequent cold storage. Maintaining an atm. of 5% to 15% CO₂ added to air or to 1% to 5% O₂ while conditioning peaches for 2 days at 20 C partially prevented fruit ripening (compared to fruit conditioned in air), as measured by flesh softening and loss of green pigment, while no off-flavours were detected. Conditioning of peaches at 20 C for 4 days in air or in air + 20% CO₂ was detrimental to fruit quality, as indicated by flesh softening or detection of off-flavours. AS

Plums

2036

Sharma (KR) and Thakur (NS). **Evaluation of wooden boxes fabricated from lesser valued farm tree species for packaging and transportation of plum.** *Journal of Food Science and Technology (India)* 29(4); 1992: 235-236

'Santa Rosa' plums packed in the packages fabricated from lesser valued farm tree species were transported by truck to the market covering a distance of about 400 km. All the packing cases remained intact except cracking of one side strip in each single box fabricated from the woods of *Albizia chinensis*, *Bombax celba* and *Ficus roxburghii*. The quality of fruits was found to be acceptable with respect to loss in net and gross wts., fruit damage, fruit firmness and total soluble solids. AS

Strawberries

2037

Paakkonen (K) and Mattila (M). **Processing, packaging and storage effects on quality of freeze-dried strawberries.** *Journal of Food Science* 56(5); 1991: 1388-1392

The surface temp. during freeze drying (from 20 to 60 C) affected the hygroscopicity of the strawberries, particularly below 0.40 a_w. Crushing before drying and low processing temp. improved sensory quality of dried strawberries and vacuum packaging improved storage stability. SRA

2038

Lesschaeve (I), Langlois (D) and Etievant (P). **Volatile compounds in strawberry jam: Influence of cooking on volatiles.** *Journal of Food Science* 56(5); 1991: 1393-1398

Volatile compounds in strawberry (*Fragaria ananassa* Duch) jam were only slightly affected by addition of sugar, but were closely related to design of the cooker and to the pressure used. Different types of behaviour were observed for the specific aromatic components. Cooker design largely influenced flavour losses at low pressures. Condensation of vapour during cooking and incorporation of the condensate in pectin sol. could result in a more flavourful product. SRA

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

2039

Joshi (NS) and Sharma (RS). **Milk chocolate.** *Indian Dairyman* 44(5): 1992: 225-230

The difference between plain chocolate and milk chocolate lies in the presence of milk solids and their sugar content. Cocoa nibs, cocoa mass, cocoa press cake, sugar, additives like emulsifiers, preservatives, flavourings and antioxidants all go into the making of milk chocolate. Use of cocoa butter is optional. Chocolate liquor is obtained by cleaning and grading, roasting, husking and winnowing and grinding of cocoa beans. This is mixed with powdered sugar, milk solids and cocoa butter. The chocolate mass is subjected to conching, storage, tempering, enrobing, moulding and packaging. GS

Sugar

2040

Rahmen (MH), Pal (SK) and Alem (F). **Effect of nitrogen, phosphorus, potassium, sulphur, zinc and manganese nutrients on yield and sucrose content of sugarcane (*Saccharum officinarum*) in flood-plain soils of Bangladesh.** *Indian Journal of Agricultural Sciences* 62(7): 1992: 450-455

The field exp. was carried out in the cropping season of 1986-87 to study the response of sugarcane to N, P, K, S, Zn and Mn fertilizers in sandy loam soils of sara series. The soil showed deficiency in N, P, S and Mn. It was found that the germination %, the number of tillers, millable canes, and yields of cane and sugar increased with the application of N, P, K, S, Zn and Mn at 150, 52, 83, 30, 8 and 5 kg/ha, respectively. Individual application of N, P, K, S and Zn increased the cane yield by 33.0, 34.4, 16.2, 16.2 and 8.7% respectively than the control. The highest

net benefit was obtained with application of N, P, K, S, Mn and Zn at the rate of 150, 52, 83, 30, 5 and 8 kg/ha respectively. KAR

2041

Patel (HS), Mehta (NJ), Patel (MP) and Vashi (RD). **Effects of farm yard manures, castor cake and press mud cake on yield and quality of sugarcane.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 93-102: 1991

The exp. conducted during the 1982-83 to 1984-85 indicated that farm yard manure (FYM) at 25 t/ha or castor cake at 625 kg/ha with 250 N, 125 P and 125 K/ha increased the cane yield, sucrose % juice and net return/ha. The treatments affected the sucrose % juice. Castor cake at 625 Kg/ha with the fertilizer gave higher sucrose % (17.84) and with max. commercial cane sugar % (12.20). This also gave max. additional net return of Rs.4251/ha. GS

2042

Banwari Lal. **Effect of nitrogen levels on growth, yield and quality of sugarcane under water-limited environment.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 109-114: 1991

The field exp. conducted in 1985-86 and 1986-87 involved growing sugarcane under 4 moisture regimes (unirrigated, 25% ASM, 50% ASM and 75% ASM) with application of 75, 150 and 225 kg N/ha. Sugarcane yield was significantly increased at 75% ASM regime by 115.68%, 89.00% and 41.50%, in 1985-86 and 128.20%, 69.01% and 40.19% in 1986-87 over unirrigated, 25% ASM and 50% ASM, respectively. The yield of sugarcane was also increased by 38.03%, 24.33% and 9.57% in 1985-86 and 64.42%, 40.61% and 16.79% in 1986-87 over control, with 75, 150 and 225 kg N/ha, respectively. The quality of sugarcane did not change due to different soil moisture regimes or different N levels. GS

2043

Onkar Singh and Kanwar (RS). **Effect of crop geometry on physiological activity and juice quality of sugarcane.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 141-147: 1991

Sugarcane crop was grown with a geometry of E. to W. and N. to S. directions of rows with 60, 90 and 120 cm spacing between rows. The physiological activity and sugarcane juice quality of cv. CoJ 64 were better under 120 cm row spacing than 60 cm spacing. The crop geometry of E. to W. row direction with 120 cm row spacing is considered to be better

than N. to S. directions of rows and 60 and 90 cm spacings between rows. The sucrose, purity, CCS, electric conductivity and pH were slightly higher while reducing sugars, fibre content, gums and flavonoids of juice were lower under E. to W. than N. to S. direction of rows. GS

2044

Bhojaraj (SK). Development of poly baffle entrainment catcher on effective device to prevent entrainment in sugar factory. *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 1-14; 1991

Prevention of entrainment and arresting of entrained sugar liquors from the evaporator bodies and vacuum pans of the sugar factories has assumed greater importance. The poly baffle entrainment catcher, which is the most advanced technique comprises of multi baffle plate made of stainless steel 304 quality as a corrugated sheet having a vortex at the top and steep angle between two layers. The vapour travelling through the arrestor strikes on the corrugated surface of the baffles which changes its direction resulting in the falling of droplets of the entrained sugar liquor. This solves the problem of entrainment and the allied losses in sugar recovery. GS

2045

Jain (PF), Ahire (CN), Joshi (JT) and Baranth (AM). Power reduction in condensing system. *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 15-28; 1991

In multijet spray condenser, cold water is provided to both spray and jet nozzles. In the modified system, instead of cold water, hot water was provided through the condenser outlet. By this, quality of water to be handled in spray pond reduced and one spray pump could be stopped, which resulted in power reduction also. Expenditure involved in the modification is Rs. 100,000 and the saving in the power consumption is Rs. 117,000. GS

2046

Dixit (AN). Optimum use of exhaust steam desuperheaters in sugar industry. *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 29-38; 1991

Optimum use of desuperheaters to reduce superheated process steam temp. in sugar industries has been considered. Fixing of capillary type good quality temp. gauge in incoming and outgoing steam in desuperheater, installing two recorder type flow meters, one in superheated steam line and other in water line to know actual flow of

both fluids are suggested. The ratio of peripheral area of desuperheater to cross sectional area of incoming pipe should be 1.25 only. Pressure maintained at Header should be 150 psig. These modifications will yield desired results in the sugar industry. GS

2047

Phatak (RN) and Malshe (VC). Condensate water treatment in sugar industries. *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 39-45; 1991

Lowering of boiler water pH, when mixed with condensate water (for economy) is a problem faced by sugar industries. All condensate samples had pH value near neutral or alkaline. But after boiling the condensate water the contaminants (sugar or its derivatives) decompose into acidic components leading to low pH. On boiling with or without caustic, variation was observed in pH value. But boiling with 50 p.p.m. caustic showed very little effect. Addition of oxidizing agents at predetermined rate (0-20 p.p.m.); scavenger resin treatment; and desorption of organics to regenerate the resin maintained the desired pH of water. GS

2048

Kapur (PPatilVL), Gautam (GK), Vasudeva (TR), Agarwal (AK), Sai Kumar (KS), Bajaj (VD). On-line estimation of crystallisation parameters and automatic feed control in vacuum pans. *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 17-27; 1991

The salient features of the microprocessor based pan boiling instrumentation system (MIPMOS) developed by the Central Electronics Engineering Research Institute (CEERI), Pilani, specifically for low grade vacuum pans of the sugar industries, have been described. MIPMOS has helped in higher productivity, energy conservation and minimisation of losses with crystal quality improvement. The hardware and software configurations; specifications of the system, and the data collected during the field operation of the system are given. GS

2049

Blupinder (K) and Sharma (KP). Techno-economic development of agro-industrial based products. I. "Ready-to-serve" sugarcane juice (pure). *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 39-50; 1991

Ready-to-serve semi-processed (pasteurized and preservative added) and processed (preservative

added and sterilized) sugarcane juice, was analysed using regression techniques, during 120 days storage at 10 C, room temp. and 40 C, to find the rate of change of sugar loss, acidity development, colour and acceptability index. The rate of sucrose loss per day in stored juice was 0.042% for processed and 0.327% for semi-processed juice stored at room temp. The loss of quality of processed juice was slower than semi-processed juice during 120 days of storage at 10 C and at room temp. GS

2050

Laxmi Narayan, Rao (KSN) and Srinivas (K). **Microprocessor based control system for mixed juice flow.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 51-58; 1991

Mixed juice flow in sugar mills affects the primary heating, juice clarification, secondary heating and further processing stages. Hence, it is important in energy conversation and to achieve process efficiency. The salient features of microprocessor based flow control system using magnetic flow meter for controlling the mixed juice flow was developed and tried in sugar factory. GS

2051

Dubey (HK), Dubey (Y) and Sharma (GC). **Effect of different growth stimulating supplements on molasses fermentation by distillers yeast.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 59-63; 1991

In molasses fermentation by yeast, growth stimulating supplements like progesterone, estrogen and oxytocin stimulated the growth, sugar utilization and the rate of alcohol production and yield of alcohol. Fermentation efficiency was 93.5% for progesterone, 94.7% for estrogen, and 94.92% for oxytocin at 30 C and at 2 p.p.m. level. GS

2052

Srinivasan (S), Gunasekaran (N), Gurugovind (J) and Chandrasekar (N). **Performance of a falling film evaporator as first effect.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 1-16; 1991

Falling film vessel (FFV) when compared with Roberts type FFV, showed better steam economy and less of scaling with better efficiency. Other advantages include no expenditure on energy for upward movement of the juice, negligible retention time and avoidance of sugar loss; no boiling point elevation; no loss of temp. difference; no juice stagnation on the heating surface; provision of 75%

recirculation of the juice; and no need to increase the exhaust pressure. GS

2053

Murthy (TSN). **Theory and practice of cane juice clarification in sulphitation sugar factories.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 17-23; 1991

For juice clarification in sulphitation plants important aspects to be considered include quality and quantity of lime, temp. control, sulphur dioxide, pH, Brix and use of some auxillary chemicals in getting better clarified juice or making the mud to settle faster. These are described. GS

2054

Kaliyamurthy (S) and Ramasamy (P). **Simultaneous achievement of good colour sugar and lowest final molasses purity - a novel idea.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 25-36; 1991

A new method to get lowest final molasses purity and good colour sugar is suggested. 'B' massecuite is cured in a continuous centrifugal machine without adding any water, to maintain the purity at 36. The 'B' fore sugar will be made into 'B' magma by the addition of 'B' light and this 'B' magma is cured by another continuous centrifugal machine with sufficient water washing. The additional requirement of machineries for this process is a centrifugal machine, pugmill, Mingler, magma pump, 'B' light pump and 'B' light tank at the pan floor. By the double curing of 'B' massecuite, 36 purity 'B' heavy can be had; with 'C' massecuite of 45 purity; 22, 23 purity of final molasses and good 'A' quality sugar. GS

2055

Verma (VK) and Tayagi (ID). **Selection of optimum pH of juice in juice sulphiter.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 37-46; 1991

The selection of optimum pH of sugarcane juice in juice sulphiter is done by providing an additional connection for lime in juice sulphiter by maintaining the initial pH of juice at 8.6 and by neutralising it to 7.1 pH by SO₂. This helped to reduced CaO contents in clear juice, less destruction of reducing sugar and better rise in purity from mixed juice to clear juice. It also improved the sugar colour and reduced sugar loss in molasses. GS

2056

Chauhan (SS). **Automation on juice sulphitation by controlling of SO₂ gas generation, a new approach.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 47-58; 1991

In juice clarification, manual control of pH gave variable results of clarification efficiency and chemical requirements. An automatic control system on clarification process has been developed. This involved the control of the SO₂ gas generation and lime dose. Auto control of SO₂ generation has been done by controlling the air supply to the burner with minor modification in the existing system. This has resulted in reduced sulphur and lime consumption, and increased the clarification efficiency and reduced the cleaning period. GS

2057

Shukla (BK). **Review of basic absolute sugar recovery and sugar recovery performance.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 59-65; 1991

The basic absolute sugar recovery (BASR) is used by the author to arrive at basic sugar recovery based on certain basic assumptions. The term represents 100% mills extraction and the basic sugar recovery is calculated on the basis of absolute juice % cane and its calculated value of Pol % (available boiling house recovery) and Brix % absolute juice based on certain assumption and a virtual final molasses purity 28.57. Sugar recovery is divided by BASR. Thus at the absolute juice purity of 85, Pol in cane is equal to 12.5% and fibre % in cane is equal to 12.5, the max. BASR is 11.625. This will give (BASR) the max. of 93% basic overall recovery. GS

2058

Agarwal (JKP) and Agarwal (S). **Nature of losses in a sugar factory.** *Proceedings of the 53rd Annual Convention of the Sugar Technologist's Association of India* 67-72; 1991

Describes known, unknown and undetermined losses such as mechanical losses due to entertainment, leakage and spillage, incorrect weighing or measurement; chemical losses due to inversion of sucrose into reducing sugars which may be due to microbiological growth in mill beds, juice pipes, centrifugal flooring; sugar loss in evaporator from syrup to sugar stage; loss in bagasse; loss in final molasses and loss in press cake. Methods for calculating the above losses are indicated. GS

2059

Kanda (K), Yasuda (Y) and Tochikubo (K). **Germination response of *Bacillus subtilis* PC1219 spores to caramelized sugar and L-asparagine.** *Journal of Food Science* 56(5); 1991: 1399-1403

In presence of L-asparagine, effective substances in caramelized sugar were primarily glucose and fructose; isomerization of glucose/fructose was observed after autoclaving (120 C, 20 min, pH 7.2). Glucose and fructose were 63 to 24 in caramelized glucose and 12 to 44 in caramelized fructose. Apparent dissociation constants were: glucose 2.2×10^{-4} , fructose 1.3×10^{-4} , L-asparagine 2.2×10^{-4} . Hydroxymethylfurfural and maltol were not effective. Aging and heat activation of spores contributed to germination, especially for response to L-asparagine and/or fructose, but not glucose. The initiation mechanism was distinguishable from the L-alanine system in requirement for aging, heat activation of spores and response to inhibitor. L-Asparagine could be partially replaced by NH₄⁺, but not by L-glutamine. AS

BAKERY PRODUCTS

2060

Abbott (J), O'Palka (J) and McGuire (CF). **Dried distillers' grains with solubles: Particle size effects on volume and acceptability of baked products.** *Journal of Food Science* 56(5); 1991: 1323-1326

Particle size distribution of sour mash dried distillers' grains solubles (DDGS) varied among producers but did not influence final vol. of quick muffins or yeast rolls. Vol. of muffins or rolls was not affected by sieve fractions, particle size distribution, grinding effects or DDGS source. Ground DDGS had little effect on baked product colour. Quick breads and yeast breads baked with DDGS produced darker colours than standard bread without DDGS. Consumer acceptability of muffins or rolls was not altered by DDGS additions (P greater than or equal to 0.05). SRA

Bread

2061

Vatsala (CN) and Haridas Rao (P). **Studies on fruit bread.** *Journal of Food Science and Technology (India)* 29(4); 1992: 213-217

Studies on fruit bread indicated that min. levels of 15.5 and 25% sugar, fat and fruit respectively were required to obtain bread with desired taste. The bread thus made had slightly undesirable hard

texture which was overcome by increasing the fermentation and proofing times from 120 to 150 and 55 to 70 min respectively. Fruit bread dough required about 6% less water as compared to that required for a normal bread dough. Fermentation rate was reduced as indicated by the Expansograph characteristics showing longer time to reach the peak (135 min) compared to normal bread dough (65 min). Fruit bread could be stored at ambient conditions of 25 - 28 C and rh of 60 - 65% after packing in polypropylene pouches (100 gauge) for a longer period of 8 days without mould growth and with min. of textural changes in contrast to that for 3 days for normal bread. AS

Cakes

2062

Bell (DA) and Steinke (LW). **Evaluating structure and texture effects of methylcellulose gums in microwave-baked cakes.** *Cereal Foods World* 36(11): 1991; 941-944

Methylcellulose gums significantly improve microwave cake height, texture and moisture retention. Special testing procedures used to evaluate their effects provided statistically significant relationships between the measured responses and the independent variables, gum concn. (0 - 4% of flour wt.) and moisture added in excess of control (0 - 30% of flour wt.). BV

MILK AND DAIRY PRODUCTS

2063

Donnelly (WJ). **Applications of biotechnology and separation technology in dairy processing.** *Journal of the Society of Dairy Technology* 44(3): 1991; 67-72

The impact of biotechnology on dairy processing within the next decade are reviewed. Microbial processes, lactose fermentation, new enzyme applications (milk protein hydrolysates, special peptides, milk fat modification), accelerated cheese ripening, milk protein fractionation and antimicrobial proteins are the topics covered in this review. BV

2064

Aguillera (JM) and Kinsella (JE). **Compression strength of dairy gels and microstructural interpretation.** *Journal of Food Science* 56(5): 1991; 1224-1228

Contour plots were developed for the compression stress (at 20% deformation) of single-component,

mixed and filled protein gels. Samples were made by heating and acidification from skim milk powder, SMP (0-20% TS), whey protein isolate, WPI (0-10% TS), and recombined cream, within pH 3.6 - 3.9, 4.6 - 4.8 and 5.1 - 5.3. At higher pH, WPI gels were stronger than SMP gels. WPI had a reinforcing effect on SMP gels, while small additions of SMP to WPI gels resulted in weaker mixed gels. Filled gels containing cream had higher compression strengths than mixed gels. Micrographs showed linking of casein chains by WPI strands in mixed gels and compatibility of fat globules with casein micelles in the protein network of filled gels. AS

Milk

2065

Nagarajan (L), Selvakumaran (R), Kumar (VU) and Umesh Kumar (S). **Deterioration in milk quality due to a psychrotrophic *Bacillus cereus* during storage at low temperatures.** *Chemie Mikrobiologie Technologie der Lebensmittel* 12(6): 1990; 168-170

Psychrotrophic *Bacillus cereus* survived in milk during pasteurization and grew at 4 C storage and increased proteolytic activity. Results indicate deterioration of milk quality due to *B. cereus*. BV

2066

Chavan (KD) and Kulkarni (MB). **Studies on processing properties of milk obtained from crossbred cows.** *Journal of Food Science and Technology (India)* 29(4): 1992; 245-246

The data indicated that the processing qualities of the milk are influenced by the genetic group of cows in terms of rennet and heat clotting times as well as curd tension. Microbial rennet is advantageous for quick coagulation while the milk from HF crossbred cows is more suited for formulating infant foods. AS

2067

Kanno (C), Shimomura (Y) and Takano (E). **Physicochemical properties of milk fat emulsions stabilized with bovine milk fat globule membrane.** *Journal of Food Science* 56(5): 1991; 1219-1223

Milk fat globules (MFG) were reconstituted with milk fat globule membrane (MFGM) and milk fat (MF). Viscosity of the reconstituted MFG was highest at pH 5.0 and 4 min emulsifying, and rose with an increase of MFGM between 40 - 80 mg/g fat. Adsorbed protein/unit fat increased at acid pH with increase of MFGM. The composition of proteins adsorbed on the surface of MFG was not influenced by factors of reconstitution. The size and specific surface area of globules were influenced by

emulsifying time, MFGM and MF concn., and pH. The size range of MFG prepared by standard method was 0.9 - 17 μm in diam. Median diam. was 5 μm and specific surface area was 15,600 cm^2/cm^3 of emulsion. AS

Milk products

2068

Samona (A) and Robinson (RK). **Enumeration of bifidobacteria in dairy products.** *Journal of the Society of Dairy Technology* 44(3): 1991: 64-66

A range of selective and non-selective media for enumeration of bifidobacteria in dairy products showed that modified Rogosa agar method is the best for recovery from yoghurt-like products. BV

2069

Fu (B), Taoukis (PS) and Labuza (TP). **Predictive microbiology for monitoring spoilage of dairy products with time-temperature integrators.** *Journal of Food Science* 56(5): 1991: 1209-1215

Arrhenius and square root equations were used to model the growth of *Pseudomonas fragi*. Significant negative history effects for growth rate and positive effects on lag phase of *P. fragi* were found under nonisothermal conditions. A correlation scheme of *P. fragi* growth was developed with the time/temp. integrators (TTI) response. Both the Arrhenius and square root model fit the lag phase and the growth rate data of the microbe at constant temp. very well. Both would be needed for shelf-life prediction. The application of TTI's for dairy products is feasible despite the history effects. SRA

2070

Desai (NB), Desai (HK) and Thakar (PN). **Response surface methodology vis-a-vis optimization of sensory quality of dairy products.** *Indian Dairyman* 44(5): 1992: 237-240

The review covers Response Surface Methodology (RSM) as a technique for improving probability of success of products in the market. The 4 steps involved in RSM, considerations while making use of RSM and application of RSM in arriving at optimal sensory quality and in setting sensory standards have also been covered. 3 references. GS

Butter

2071

Schooner (F), Simard (RE) and Pandian (S). **Colorimetric assay for free fatty acids in butter**

using flow-injection and immobilized enzymes. *Journal of Food Science* 56(5): 1991: 1229-1232

Butyrate kinase (BK) was extracted from *Escherichia coli* DH5 pJc7*, purified, immobilized on porous glass beads and packed in a glass tube as a biosensor coupled with a flow-injection analysis system (FIA). The limits of detection were: FIA (25 p.p.m.) and batch method (BM, 5 p.p.m.). BK is highly specific for butyric, propionic and valeric acids. Regression coeff. values were: FIA $r = 0.992$ and free enzyme $r = 0.987$. The FIA and BM were tested on butter samples with high correlation ($r = 1.000$) between the methods. Correlation coeff. were: $r = 0.994$ and $r = 0.988$ between acid degree value and FIA/BM. AS

2072

Garcia (HS), Amundson (CH) and Hill (CGJr). **Partial characterization of the action of an *A. niger* lipase on butteroil emulsions.** *Journal of Food Science* 56(5): 1991: 1233-1237

A commercially available lipase (*Aspergillus niger*, APF-12) was employed to hydrolyze an emulsified butteroil substrate. HPLC analyses of the reaction products indicated that short chain fatty acid residues (e.g., butyric acid) were preferably hydrolyzed at pH 5 whereas the overall rate of hydrolysis for all major fatty acids showed a pH optimum between 6 and 7. This indicated the possibility of directing the selectivity of lipolysis in butteroil to enhance production of short-chain fatty acids associated with flavour development. The optimal temp. was ca. 35 C. Different cations also affected rate of hydrolysis. AS

Cheese

2073

El-Abbassy (MZ), Aly (ME) and Talha (SN). **Effect of lecithin addition on the yield and quality of soft cheeses.** *Die Nahrung* 35(6): 1991: 633-640

The effect of lecithin added at levels of 0.025, 0.050 and 0.075% to cheese milk used in manufacture of Domiati and Kareish cheese on yield, wt. losses and quality of cheese was studied. Addition of lecithin increased cheese yield and decreased wt. losses during pickling. The bacterial content of all cheeses treated with lecithin was higher than that of control cheese when fresh and during pickling. Cheese made with added lecithin showed higher moisture, salt, fat and acidity than control cheese. The total N percentage was almost the same in all treatments. The levels of both soluble N and total volatile fatty acids in cheese containing lecithin were higher than in the control cheese. No marked differences were evaluated for flavour, body and texture of fresh

cheese made from milk with or without lecithin, while during pickling the organoleptic properties of cheese containing lecithin were improved. AS

2074

Ha (JK) and Lindsay (RC). **Volatile branched-chain fatty acids and phenolic compounds in aged Italian cheese flavours.** *Journal of Food Science* 56(5): 1991: 1241-1247, 1250

Analysis of cheeses by capillary GC revealed adequate concn. of certain branched-chain fatty acids (BCFAs) and phenols present to contribute distinctive flavours. Butyric acid-like flavours in cow's milk Romano cheese were modified by 2-methyl-butanoic and 2-ethylbutanoic acids which provided sweet, fruity notes. 4-Ethyl-octanoic acid provided a characterizing goaty note to Romano cheese made from mixed goats' and cows milk. 4-methyl-octanoic and 4-ethyl-octanoic acids along with *p*-cresol, *m*-cresol, and 3,4-Di-methylphenol appeared responsible for sheepy notes in sheep milk Romano cheese. Phenol and cresols (o,m,p) strongly contributed phenolic and medicinal flavour notes to smoked Provolone cheese. Low concn. of BCFAs and phenols appeared to provide desirable background flavours to Parmesan cheeses. AS

2075

Chandan (RC). **Cheeses made by direct acidification.** *Indian Dairymen* 44(4): 1992: 180-188

Latin American White (LAW) cheeses are made from acidified whole milk, skim-milk, cream or mixture thereof. Ripening, shelf-life, composition, nutrient, density and uses of LAW cheeses are described. *Chhana* which is also a common acidified cheese is described with its production techniques, and its utilization in preparing *sandesh* and *rasogolla*. GS

Cheddar cheese

2076

Trepanier (G), Simard (RE) and Lee (BH). **Lactic acid bacteria relation to accelerated maturation of Cheddar cheese.** *Journal of Food Science* 56(5): 1991: 1238-1240, 1254

2077

Tewari (BD), Vipin Kumar and Singh (S). **Spray drying process for accelerated ripened Cheddar cheese.** *Indian Dairymen* 44(5): 1992: 244-248

Method for manufacture of dried cheese from Cheddar cheese and accelerated ripened curd slurry has been described. Preparation of slurry for spray drying consists of selection of cheese, blending,

addition of emulsifying salts, water and other additives followed by heat processing and homogenization. The slurry is spray dried, cooled, packed and stored as powder. The cheese powder from Cheddar cheese has got bulk density 0.46 g/ml, dispersibility 34.20 g, flowability 37°, sinkability after 6 min in terms of % absorbance 1.0 and the corresponding values for powder made from accelerated ripened curd are 0.46 g/ml, 29.34 g, 40° and 0.85 respectively. Slurry obtained from blend A (cow milk Cheddar cheese ripened with microbial rennet for 8, 4-6 and 2-3 months is blended in the ratio of 1:2:1) has higher pH, titratable acidity, soluble protein, but is lower in its salt and total volatile fatty acid than that from blend B (microbial rennet, cow milk Cheddar cheese (8 months old) and accelerated ripened curd blended in the ratio of 1:3). Reconstituted cheese spread could be prepared by mixing 2 parts of powder with 3 parts of water at temp. of 50 - 55 C and indirectly heating to 65 C with constant stirring. The product is allowed to set at 8-10 C for about 3-4 min before it is served. GS

Kachhagolla

2078

Sen (DC). **Kachhagolla - a delicious milk sweetmeat of Bengal.** *Indian Dairymen* 44(5): 1992: 249-251

Preparation of *Kachhagolla* involves *chhana* prepared from cow's milk is kneaded and mixed with cane sugar at 30 to 35% by wt. of *chhana* in an iron karahi and cooked with controlled heating and stirring. It develops its characteristic sticky granular texture and aroma. In *kachhagolla*, moisture, fat, protein, sucrose, ash, titratable acidity, water soluble acid, free fatty acidity and free fat contents vary with the source of the market sample. Ordinarily the major constituents will have fat 6.14 - 9.54%, protein 10.32 - 11.26%, moisture 25.14 - 28.73% and sucrose content of 29.58 - 34.76%. *Kachhagolla* is packaged in folding paper board cartons and it has a limited shelf-life of 1 to 2 days in normal and between 3 and 5 days in refrigerated temp. GS

Rasogolla

2079

Tambat (RV), Khorgade (AB), Changade (SP) and Kaloti (SV). **Effect of fat and maida levels on rasogolla preparation.** *Indian Dairymen* 44(4): 1992: 203-205

Cow milk was standardised to 3, 3.5, 4 and 4.5% fat levels and converted to *chhana* using 1.5% lactic acid sol. During *rasogolla* preparation, maida levels were 0, 2, 4, 6 and 8% on wt. basis of *chhana*.

Sensory score for colour and appearance, body and texture, flavour and taste and overall acceptability of *rasogolia* was evaluated on a 25 point scale. No remarkable changes in sensory score was observed due to various fat levels and were non significant. However, 2 and 4% maida levels recorded the highest score and were at par. Combined effect of fat and maida levels were non significant. *Chhana* yield, moisture content, fat losses in whey and coagulant sol. required for *chhana* preparation were increased with the increase of fat levels in milk. AS

Wheys

2080

Colbert (LB) and Decker (EA). **Antioxidant activity of an ultrafiltration permeate from acid whey.** *Journal of Food Science* 56(5): 1991: 1248-1250

Results of the study indicate that both acid whey and acid whey ultrafiltration (UF) permeate could be used as "natural" antioxidants in foods. Acid whey inhibited up to 90% of Fe-catalyzed oxidation phosphatidylcholine liposomes. Lipid oxidation catalysts, including Fe, lipoxidase, photoactivated riboflavin and hydrogen peroxide-activated met Mb, were inhibited by acid whey and its UF permeate. The antioxidant activity of the UF permeate increased with increasing pH (5.4 - 7.0) Use of acid whey and its UF permeate as an antioxidant would increase utilization of a major by-product of the cheese industry and would decrease whey disposal problems. SRA

Whey protein concentrates

2081

Kilara (A) and Mangino (ME). **Relationship of solubility of whey protein concentrates to thermal properties determined by differential scanning calorimetry.** *Journal of Food Science* 56(5): 1991: 1448-1449

Twelve samples of whey protein concentrates manufactured under defined conditions were analyzed for their composition. Samples were subjected to differential scanning calorimetry to determine the onset temp. and enthalpy of denaturation. Solubility of the samples at pH 7.0 was determined using three procedures. In each instance, solubility significantly correlated with both onset temp. and enthalpy of denaturation. Enthalpy of denaturation may serve as a predictor for solubility of proteins. AS

Milk proteins

2082

Hung (SC) and Zayas (JF). **Emulsifying capacity and emulsion stability of milk proteins and corn germ protein flour.** *Journal of Food Science* 56(5): 1991: 1216-1218, 1223

Comparative studies of corn germ protein flour (CGPF), non-fat dry milk (NFDM), whey protein concentrates (WPC), and sodium caseinate (SC) showed that they were effective protein sources in the model system in terms of emulsifying capacity (EC) and emulsion stability (ES). EC and ES of all samples increased with increased concn. of protein. A max. EC at pH 8.0 was obtained for CGPF, WPC and SC while NFDM showed a max. EC at pH about 7.0. Minimal pH effect on ES was found. No effect of incubation temp. and incubation time on EC and ES of these samples was detected. SRA

2083

Strange (ED), Van Hekken (D) and Thompson (MP). **Qualitative and quantitative determination of caseins with reverse-phase and anion-exchange HPLC.** *Journal of Food Science* 56(5): 1991: 1415-1420

Whole native caseinate (WNC) and casein (CN) fractions from preparative DE-52 cellulose urea columns were chromatographed using C-8 reverse-phase (RP) and DEAE-type anion exchange (AEx) HPLC systems. With RP, α_{s2} -CN and k -CN eluted first as several small peaks; α_{s1} -CN eluted later as two peaks, followed by β -CN peaks. With AEx, k -CN eluted early as a group of peaks, β -CN eluted next, and α_{s1} -CN and α_{s2} -CN coeluted last. Standard curves were prepared for α_{s1} -CN and β -CN using RP-HPLC and showed correlation coeff. of 0.99 and 0.98 respectively. The caseins in WNC, nonfat dry milk casein, commercial casein(ates) and caseins from milks of individual cows were determined. AS

MEAT AND POULTRY

2084

Madsen (M), Milne (JAC) and Chambers (P). **Critical control points in the slaughter and dressing of farmed crocodiles.** *Journal of Food Science and Technology (India)* 29(4): 1992: 265-267

2085

Pommier (SA). **Characterization of the increase in paleness of milk-fed veal during refrigerated storage.** *Journal of Food Science* 56(5): 1991: 1455-1456

Ninety-five Holstein bull calves raised on milk replacer were used to study the development of meat

colour during storage. Luminous reflectivity (Y) of the pectoralis profundus muscle increased an average of 22 lux units after a 3-day aging period. Forty-five-minute colour measurements correlated with a 3-day colour measurements ($r = 0.69$) and pre-slaughter hemoglobin ($r = 0.53$), which also correlated with 3-day colour measurements ($r = 0.65$). Meat colour at 45 min and pre-slaughter haemoglobin concn. contributed significantly to predict 3-day Y values ($R^2 = 0.59$). However, this procedure was not accurate to predict colour of meat at 3 days after slaughter. AS

2086

Appu Rao (AG). **A stoichiometric analysis of bovine serum albumin-gossypol interactions: A fluorescence quenching study.** *Indian Journal of Biochemistry and Biophysics* 29(2); 1992: 179-182

The interaction of gossypol with bovine serum albumin, human serum albumin and n-bromosuccinimide-modified bovine serum albumin has been followed by fluorescence quenching measurements. The presence of a high affinity site (association constant $K = 2.2 \times 10^6 \text{ M}^{-1}$) for gossypol on bovine serum albumin and human serum albumin is indicated. The stoichiometry of binding for the high affinity site was evaluated using Job's method of continuous variation, thereby suggesting the formation of 1:1 complex. Modification of the tryptophan residues on bovine serum albumin does not affect the binding of gossypol to either high or low affinity site of albumin. AS

Meat

2087

Park (YW), Kouassi (MA) and Chin (KB). **Moisture, total fat and cholesterol and goat organ and muscle meat.** *Journal of Food Science* 56(5); 1991: 1191-1193

Moisture, total fat and cholesterol in liver, kidney, heart, *Longissimus dorsi* (LD) and *Biceps femoris* (BF) muscles of 2 goat breeds (Alpine and Nubian) were determined; and differences in lipids between these tissues as well as between breeds of goat were compared. Samples from goat kids fed with a complete diet containing 4 levels of Ca for 12 wk before slaughter were used for the study. Ranges of moisture (%) in liver was 68.4 - 82.9, kidney 75.8 - 85.0, heart 69.7 - 84.3, LD 74.8 - 83.2, and BF 76.0 - 84.7. The mean total fat % was liver 3.26, kidney 3.14, heart 4.32, LD 2.27 and BF 2.03 for pooled data of two breeds. The difference in cholesterol between liver and kidney was significant ($P < 0.01$). The two skeletal muscles contained significantly ($P < 0.01$ or 0.05) less cholesterol than all organ

tissues. Heart contained less cholesterol ($P < 0.05$) than liver or kidney. Fat and cholesterol were influenced by dietary Ca, breed and tissue, while moisture was affected only by tissue. SRA

2088

Ha (JK) and Lindsay (RC). **Volatile alkylphenols and thiophenol in species-related characterizing flavours and red meats.** *Journal of Food Science* 56(5); 1991: 1197-1202

2089

Shahidi (F) and Pegg (RB). **Novel synthesis of cooked cured-meat pigment.** *Journal of Food Science* 56(5); 1991: 1205-1208

Cooked cured-meat pigment was synthesized from bovine blood and a nitrosating agent in aqueous sol. at elevated temp. Effects of reductant(s) and base in the reaction mixture were investigated on the yield and purity of the pigment. The best yield of pigment was 95% with purity $> 98\%$ in most cases. Absorption characteristics of the pigment were identical to those of pigments extracted from a nitrite-cured ham or from hemin-nitric oxide synthesis. Colour imparted to comminuted pork by the pre-formed pigment, upon cooking, and its colour stability thereafter, were indistinguishable from that of nitrite-cured meat, yet depended on the myoglobin content. AS

2090

Shahidi (F), Pegg (RB) and Shamsuzzaman (K). **Colour and oxidative stability of nitrite-free cured meat after γ -irradiation.** *Journal of Food Science* 56(5); 1991: 1450-1452

The effects of 5 and 10 kGy irradiation on the colour and oxidative stability of meats treated with nitrite or a nitrite-free curing system were investigated. Irradiation had no detrimental effects on the colour or flavour of either cured samples. Polyphosphates had a beneficial effect on oxidative stability but had a slight detrimental effect on colour stability of irradiated samples. BV

2091

Palombo (R), Van Roon (PS), Prins (A) and Krol (B). **Comparative study on three methods for determining air content in meat batters.** *Journal of Food Science* 56(5); 1991: 1453-1454

Measurement of air content in meat batters is useful, as larger amounts of air negatively affect some properties of comminuted products. Three methods were compared. One method (Vemag) involved liberation of entrapped air from the batter by the combined effects of vacuum and mechanical

forces. The other two methods involved application of under- (Smrat) or over- (Handtmann) pressure and calculation of the air content using Boyle's ideal gas law. The Smrat showed the lowest reproducibility. However, being the most rapid and easy to use, it was the method of choice for routine quality and process control. The Vemag and more favourably the Handtmann were recommended for accurate and reproducible detn. AS

Beef

2092

Kim Ha (J) and Lindsay (RC). **Volatile fatty acids in flavours of potatoes deep-fried in a beef blend.** *Journal of the American Oil Chemist's Society* 68(5): 1991: 294-298

The volatile free fatty acids were analyzed in commercial french-fried potatoes that had been deep-fried in beef tallow-hydrogenated vegetable oil shortening. The results showed that many of the volatile fatty acids present in beef tallow were transferred to the potatoes. Of the fatty acids derived from beef tallow, butanoic, 2-methylbutanoic, 3-methylbutanoic, heptanoic, 4-methyltanoic, and nonanoic acids were present in concn. above their respective thresholds, and should contribute to fallow-like flavours. Several unsaturated volatile fatty acids also were identified, and they should contribute to the general deep-fried potato flavour. AS

2093

Mitchell (GE), Giles (JE), Rogers (SA), Tan (LT), Naldoo (RJ), Ferguson (DM). **Tenderizing, ageing and thawing effects on sensory, chemical, and physical properties of beef steaks.** *Journal of Food Science* 56(5): 1991: 1125-1129

2094

Shackelford (SD), Koohmaraie (M), Whipple (G), Wheeler (TL), Miller (MF), Crouse (JD), Reagan (JO). **Predictors of beef tenderness: Development and verification.** *Journal of Food Science* 56(5): 1991: 1130-1135, 1140

2095

Payne (CA), Moody (WG), Langlois (BE), Means (WJ) and Aaron (DK). **Microbial characteristics of three formulations of precooked, vacuum-packaged restructured beef steaks.** *Journal of Food Science* 56(5): 1991: 1136-1140

2096

Papadopoulos (LS), Miller (RK), Acuff (GR), Lucia (LM), Vanderzant (C), Cross (HR). **Consumer and trained sensory comparisons of cooked beef top**

rounds treated with sodium lactate. *Journal of Food Science* 56(5): 1991: 1141-1146, 1153

2097

Stutz (HK), Silverman (GJ), Angelini (P) and Levin (RE). **Bacteria and volatile compounds associated with ground beef spoilage.** *Journal of Food Science* 56(5): 1991: 1147-1153

2098

Minerich (PL), Addis (PB), Epley (RJ) and Bingham (C). **Properties of wild rice/ground beef mixtures.** *Journal of Food Science* 56(5): 1991: 1154-1157

2099

Miller (AJ) and Menichillo (DA). **Blood fraction effects on the antibotulinal efficacy of nitrite in model beef sausages.** *Journal of Food Science* 56(5): 1991: 1158-1160, 1181

2100

Mohan Reddy (I) and Carpenter (CE). **Determination of metmyoglobin reductase activity in bovine skeletal muscles.** *Journal of Food Science* 56(5): 1991: 1161-1164

2101

Nuckles (RO), Smith (DM) and Merkel (RA). **Properties of heat-induced gels from beef skeletal, heart, lung and spleen protein fractions.** *Journal of Food Science* 56(5): 1991: 1165-1170

2102

Wild (JL), Sebranek (JG) and Olson (DG). **Grinding time and pressure developed in beef and pork: Effects of temperature and fat.** *Journal of Food Science* 56(5): 1991: 1171-1175

2103

Horgan (DJ), Kurth (LB) and Kuypers (R). **pH effect on thermal transition temperature of collagen.** *Journal of Food Science* 56(5): 1991: 1203-1204, 1208

Differential scanning calorimetry (DSC) was used to measure the thermal transition temp. of bovine intramuscular and tendon collagen. Equilibration of the collagen in buffers in the pH range 4.25-7.40 resulted in a decline in transition temp. with decreasing pH. This was more pronounced in collagen with higher concn. of aldimine crosslinks. It was proposed that the postmortem pH decline was responsible for the thermal transition temp. decline observed by other workers. Therefore, thermal transition temp. measurements must be performed on collagen samples that have been thoroughly

equilibrated to a common pH if they are to be used as indices of structural changes. AS

Pork

2104

Brewer (MS), McKeith (F), Martin (SE), Dallmier (AW) and Meyer (J). **Sodium lactate effects on shelf-life, sensory and physical characteristics of fresh pork sausage.** *Journal of Food Science* 56(5); 1991: 1176-1178

2105

Decker (EA) and Crum (AD). **Inhibition of oxidative rancidity in salted ground pork by carnosine.** *Journal of Food Science* 56(5); 1991: 1179-1181

2106

Andersen (HJ) and Skibsted (LH). **Oxidative stability of frozen pork patties. Effects of light and added salt.** *Journal of Food Science* 56(5); 1991: 1182-1184

2107

Defreitas (Z) and Molins (RA). **Mechanically deboned pork use in fermented meat spreads.** *Journal of Food Science* 56(5); 1991: 1185-1190

Poultry

Chickens

2108

Zubillaga (MP) and Maerker (G). **Quantification of three cholesterol oxidation products in raw meat and chicken.** *Journal of Food Science* 56(5); 1991: 1194-1196, 1202

The results indicates that cholesterol oxidation products in meat and chicken could be measured at levels below 1 p.p.m. and 7-ketocholesterol and the isomeric 5,6-epoxides occur in such tissues with the amounts of the ketone exceeding those of the epoxides. SRA

Products

Eggs

2109

Satyanarayana Rao (TS). **Changes in solubility, β -carotene and development of non-enzymatic browning of spray-dried, foam-mat-dried and freeze-dried whole egg powders packed in different packaging materials.** *Journal of Food Science and Technology (India)* 29(4); 1992: 231-234

Drying conditions and packaging materials did not significantly influence solubility, destruction of β -carotene and development of non-enzymatic browning of spray-dried, foam-mat-dried and freeze-dried egg powders during storage at 4, 19 - 27 and 37 C upto 365 days. However, the storage at 42 and 55 C had significant effect on these attributes in all the 3 types of egg powders packed in cans and flexible pouches. AS

2110

Juhi Raikhy and Bawa (AS). **Studies on pickled chicken eggs.** *Journal of Food Science and Technology (India)* 29(4); 1992: 246-248

Sensory evaluation of egg pickles prepared with citric, acetic, lactic and tartaric acids indicated overall acceptability of the product made with lactic and tartaric acids when used alongwith 10% common salt, spices, condiments and oil. The storage period did not affect the sensory parameters. AS

2111

Wang (C) and Shelef (LA). **Factors contributing to antilisterial effects of raw egg albumen.** *Journal of Food Science* 56(5); 1991: 1251-1254

Sensitivity of *Listeria monocytogenes* strain Scott A and Brie-1 to several factors in raw egg albumen was investigated. A concn. of ca 15% of albumen in trypticase soy broth was listeristatic after 24 h at 35 C, and listericidal effects were observed at higher concn. Supplementation of albumen with Fe and biotin did not reverse the inhibition. Preheating of albumen (50 - 80 C) caused progressive loss of antilisterial effects. Supplementation of broth with lysozyme (> 1 mg/mL) produced antilisterial effects that were enhanced at pH 9; conalbumin (> 6 mg/mL) suppressed cell growth, while ovomucoid (> 2 mg/mL) was inhibitory only at pH 9. Results inferred that antilisterial effects of albumen were caused primarily by lysozyme and were enhanced by ovomucoid, conalbumin and alkaline pH. AS

2112

Chung (SL) and Ferrier (LK). **Partial lipid extraction of egg yolk powder: Effects on emulsifying properties and soluble protein fraction.** *Journal of Food Science* 56(5); 1991: 1255-1258

Solvent extraction to remove lipid from egg yolk decreased emulsifying properties of the resulting protein concentrates. Hexane and isopropanol had the least effects. Hexane-isopropanol extraction (77:23, w:w) reduced emulsifying activity (per 25 mg

protein) about 14% and protein solubility decreased from 15.7 to 13.8% but removed more than 50% of the lipid from egg yolk powder. Chloroform-methanol decreased total emulsifying activity upto 41%. Ovalbumin in the water-soluble fraction of extracted egg yolk powder reduced its emulsifying effectiveness. SRA

2113

Chung (SL) and Ferrier (LK). **Conditions affecting emulsifying properties of egg yolk phosvitin.** *Journal of Food Science* 56(5); 1991: 1259-1262

The effects of protein concn. (0.1 - 2.0%), oil vol. fraction (0.17 - 0.67), mixing speed (10,000 - 22,000 r.p.m.) and mixing time (0.5 - 8 min) on the emulsifying properties of phosvitin and bovine serum albumin (BSA) were compared. Emulsifying activity and emulsion stability increased with protein concn., oil vol. fraction and mixing. Effects of these variables were assessed quantitatively using an empirical equation. Mixing speed had the greatest influence and protein concn. had the least influence on emulsifying activity for both phosvitin and BSA. For emulsion stability, mixing speed had the greatest influence for phosvitin; oil vol. fraction had the greatest influence for BSA. Phosvitin was a better emulsifier than BSA at pH 7. AS

2114

Singh (RP) and Panda (B). **Storage stability of oil-based pickled quail eggs.** *Indian Journal of Poultry Science* 26(4); 1991: 221-225

Storage stability of quail eggs pickled in oil-based gravy containing 3% common salt and 2% acetic acid and stored in rigid (glass and plastic) jars or in flexible (PFP laminate, HDPE and PP) pouches for 9 and 15 months at mean ambient (28 C; 61% RH) and refrigerated (4 - 6 C; 80 - 85% RH) temp., were investigated. The rates of diffusion of both acid and salt were faster in egg white than in yolk and under ambient than refrigerated storage. Pickling caused approx. 2-fold increase in shear values of egg white. A progressive increase in % free fatty acids and a decrease in sensory quality occurred with storage time. Halophilic counts remained fairly low. Coliforms, anaerobes, *Salmonella* and coagulase-positive staphylococci were not detected in pickles throughout storage. The product could be safely stored in HDPE (330 G) pouches for 8 and 15 months under ambient and refrigerated conditions, respectively, instead of conventional rigid containers or intermediate cost PFP laminate. AS

2115

Maiti (D) and Biswas (S). **Effect of feeding deoiled niger (*Guizotia abyssinica*) cake on egg**

production and egg quality. *Indian Journal of Poultry Science* 26(4); 1991: 229-232

Deoiled niger cake (DNC) was included in the test diet of egg replacing groundnut cake (DGNC) protein at 0, 25, 50, 75 and 100% levels on equal nitrogenous and isocaloric basis. The birds were fed from 127 days of age. For egg quality studies, fresh eggs (8 eggs from each group) were collected at random at 278, 279 and 280 days of age. Egg wt., shape index, thin white %, albumin index, yolk index, shell thickness and Haugh unit score were recorded. When DNC was substituted up to 75% protein level, no adverse effect on egg production, egg wt., feed consumption per dozen of eggs and feed consumption per kg egg wt. was observed. Egg quality was also not affected by the substitution up to 100% DNC level except lowering of the egg wt. GS

2116

Singh (SV) and Panda (PC). **Peeling property of boiled eggs. A review.** *Poultry Guide* 29(6); 1992: 69-71, 73-79

Peeling property of boiled eggs is related to coagulation of egg white. The factors influencing coagulation of egg white are temp., dilution, salt, sugar, acid and alkali. The role of these are described. Storage, pH, shell treatment, oil coating, and the sp. of origin of egg are also factors influencing the peeling property of eggs. Cooking techniques which influence the peeling property are illustrated. The review concluded with the quality of cooked eggs including flavour, appearance and acceptability of peeled eggs. GS

SEAFOODS

2117

Paturkar (AM), Sherikar (AA), Jayarao (BM) and. **Prevalence of *Salmonella* in meats and seafoods of Bombay city.** *Journal of Food Science and Technology (India)* 29(4); 1992: 242-243

Fifteen of the 166(9%) meat samples tested were positive for *Salmonella* in contrast to its absence in 96 fish samples, collected in Bombay. The serotype *S. saintpaul* predominated in the slaughterhouse meat as against the dominance of *S. mbandaka*, *S. adelaide*, *S. liverpool*, *S. anatum*, *S. derby* and *S. butantan* in market meat samples. *S. mbandaka* was frequently isolated from the retail market beef samples. AS

2118

Chung (KH) and Lee (CM). **Water binding and ingredient dispersion pattern effects on surimi**

gel texture. *Journal of Food Science* 56(5); 1991: 1263-1266

Water binding, thermotransitional properties and the dispersion pattern of ingredients were studied in relation to their texture-modifying effects in surimi gels. The DSC-measured bound water (unfreezable at -30 C) of surimi gels prepared with potato starch with and without pregelatinization highly correlated with compressive force ($r = 0.94$) and inversely correlated with expressible moisture ($R = 0.99$) of the gels. For nonfish proteins, however, physically bound water contributed more than the DSC-measured bound water to gel strength. The ability to undergo thermal transition (size expansion and water absorption) and dispersion pattern of ingredients were responsible for the differences in texture-modifying effects. AS

Oysters

2119

Chai (T), Liang (KT), Pace (J) and Schlimme (DV). **Effect of heat processing on quality of pasteurized oysters.** *Journal of Food Science* 56(5); 1991: 1292-1294

Constant heating time at different temp. and constant temp. with different heating times combinations were studied to determine optimum heat process for oyster pasteurization in plastic pouches. Heating for 8 min at 75 - 76 C gave optimum physical and sensory quality to the product. Crude amylase and peroxidase extracts from oysters were inactivated by optimum treatment, but lipase retained about 15% of activity. AS

Seal

2120

Synowiecki (J) and Shahidi (F). **Lipid and pigment extraction from mechanically separated seal meat.** *Journal of Food Science* 56(5); 1991: 1295-1297

Mechanically separated seal meat (MSSM) was washed 3x with water. Total hemoprotein pigment content of MSSM was reduced by 49.5% after the first washing, 65.1% after the second, and 67.5% after the third. Hunter L value (lightness) was increased from 14.8 to 32.4 after three washings. Hunter L values correlated ($r = -0.990$) well with total hemoprotein content of the meat. The total lipid content of the meat was also reduced by 30.7 to 57.5%, depending on the original fat content of the sample after washings. The yield of meat protein after the second washing was increased from 32%

to 70.5% when a centrifugation instead of filtration method was employed. AS

Squids

2121

Selvaraj (P), Indra Jasmine (G) and Jeyachandran (P). **Effect of polyphosphate dip treatment on frozen storage of Indian squid *Loligo duvauceli* Orbigny.** *Journal of Food Science and Technology (India)* 29(4); 1992: 248-249

Squid fillets (Mantles) given a dip treatment in aqueous trisodium polyphosphate sol. (5% w/v) prior to freezing showed reduced protein denaturation as evidenced by improved texture, decreased thaw and wt. loss, retention of salt soluble and α -amino nitrogens as compared with control squids during frozen storage. The overall acceptance is better in polyphosphate treated samples than in control. AS

Fish

2122

Voldrich (M), Dobias (J), Kalac (PJr) and Curda (D). **Changes of fatty acid composition during the processing of fish.** *Die Nahrung* 35(6); 1991: 663-664

Marked changes of the fatty acid comp. were observed in the smoked and marinated (processed) samples of mackerel meat. The processed fillets contained about 70% of n-3 polyunsaturated fatty acids (PUFAs). In case of smoked fish n-3 PUFAs loss was higher probably due to hydrolysis of fat before processing. In spite of the losses observed in the fish products-both marinated and smoked are an important source of n-3 PUFAs in human nutrition. BV

2123

Boyle (JL), Lindsay (RC) and Stuibler (DA). **Adenine nucleotide degradation in modified atmosphere chill-stored fresh fish.** *Journal of Food Science* 56(5); 1991: 1267-1270

Effects of CO₂ modified atm. on degradation of adenine nucleotides in chill-stored whitefish (*Coregonus clupeaformis*) and rainbow trout (*Salmo gairdneri*) were studied. K values were determined during storage up to 26 days. Results indicated CO₂ atm. did not alter K values compared to those observed for aerobically held fish. However, both CO₂ atm. and potassium sorbate-dipping of fillets caused decreases in hypoxanthine concn. compared to untreated aerobically held samples. AS

2124

Ohashi (E), Takao (Y), Fujita (T), Shimizu (Y) and Egashira (M). **Semiconductive trimethylamine gas sensor for detecting fish freshness.** *Journal of Food Science* 56(5): 1991: 1275-1279, 1286

Characteristics were studied on In_2O_3 treated with 5 mol% MgO responses to 300 p.p.m. trimethylamine (TMA), dimethylamine (DMA), ammonia and other gases evolved from several different fish muscles stored under different conditions. Sensitivities of the In_2O_3 -MgO sensor element were higher in order of TMA, DMA and ammonia over the operating range 330-620 C. Sensor responses were directly proportional to concn. of TMA in fish muscle in the presence of other evolved gases, irrespective of types of fish muscle or storage time. AS

Finfish

2125

Himelbloom (BH), Brown (EK) and Lee (JS). **Microorganisms on commercially processed Alaskan finfish.** *Journal of Food Science* 56(5): 1991: 1279-1281

Whole and processed Alaskan fish were examined for aerobic plate counts, total coliforms, and *Escherichia coli*. Washing whole salmon and halibut reduced skin microbial counts from $10^3/\text{cm}^2$ to $10^2/\text{cm}^2$. Whole and dressed fish had coliform counts $< 13/\text{cm}^2$ and *E. coli* counts $< 0.3/\text{cm}^2$. Alaska pollock and Pacific cod fillets had microbial counts between $10^3/\text{g}$ and $10^6/\text{g}$, coliform counts $< 70/\text{g}$, and *E. coli* counts $< 4/\text{g}$. Whole fish contained microbial flora predominated by *Moraxella* sp. whereas dressed fish and fillets had microbial flora consisting of *Arthrobacter/Corynebacterium*, *Flavobacterium*, and *Pseudomonas* sp. Microorganisms on conveyor belts and other contact surfaces may have contributed contaminants to fillets. AS

Salmon

2126

Girard (B) and Nakai (S). **Static headspace gas chromatographic method for volatiles in canned salmon.** *Journal of Food Science* 56(5): 1991: 1271-1274

Amount of fish placed in vials as well as incubation temp. and time were factors studied to improve a static headspace sampling method applied to analyze volatiles in canned salmon. A random-centroid optimization (RCO) program was used to simultaneously search for the optimal levels

of other factors, namely, initial oven temp., column headpressure, and total flowrate. RCO was an effective optimization program while allowing testing of several treatments at a time. The optimal conditions of operation permitted detection of 80 volatile compounds, 34 of which were identified including aldehydes, alkanes, aromatic compounds, sulphur-containing compounds, alkenes, ketones, several miscellaneous compounds plus an alcohol and an acid. AS

2127

Durance (TD) and Collins (LS). **Quality enhancement of sexually mature chum salmon *Oncorhynchus keta* in retort pouches.** *Journal of Food Science* 56(5): 1991: 1282-1286

Sexually mature or late-run chum salmon muscle was packaged in thin-profile retort pouches and in conventional 307 x 200 metal cans. After retort processing to equivalent lethality, samples were evaluated by sensory and instrumental methods. The pouch product was firmer, more fibrous, drier and chewier than the canned. Less late-run flavour and greater overall acceptability were reported for pouch-processed samples. More free liquid was found in pouches than in cans. Histological examination revealed a more compact structure in chum muscle processed in retort pouches, possibly due to air over-pressure applied to flexible pouches during processing. AS

Products

Fish

2128

Konstance (RP). **Axial compression properties of kamaboko.** *Journal of Food Science* 56(5): 1991: 1287-1291

Kamaboko, a gelled seafood product from frozen surimi, has distinctive textural properties. Characterization of those properties, using an integrated approach to rheological studies, was accomplished by means of an instrumental texture profile analysis and evaluation of resultant stress-strain relationships. The material had near-ideal area expansion even at compressions of 60% while retaining its highly elastic texture. Apparently the product did not yield through 80% compression. Hardness of the kamaboko at 80% compression was characterized by a local max. at 37.5 C which may have been related to processing temp. of the initial surimi gel-set used in a double-gel-set procedure. Evaluation of stress-strain relationships confirmed the incompressible nature of the gel and showed relatively slight variations between the Young's

modulus and the deformability modulus. The elastic limit of the kamaboko increased significantly as temp. increased from 25 to 50 C. AS

Fish oil

2129

Hsieh (Y-TL) and Regenstein (JM). **Factors affecting quality of fish oil mayonnaise.** *Journal of Food Science* 56(5): 1991: 1298-1301, 1307

Packaging conditions, antioxidants, metals and storage temp. affected the quality of fish oil (FO) mayonnaise (FOM). TBHQ was a successful antioxidant but ascorbate was not. N₂ retarded oxidation more than TBHQ. The metal content of FO was as low as soy oil (SO), suggesting that differences in quality deterioration were not due to metal content. FOM was more stable at refrigerator temp. (2 C) than at higher temp. (30 C). The sensory quality of deodorized FOM was equal to SO mayonnaise using TBHQ (0.02%), N₂, and storing at 2 C for 14 wk. AS

PROTEIN FOODS

2130

Ngo Som (J), Prajwala Mouliswar, Daniel (VA), Malleshi (NG) and Venkat Rao (S). **Digestibility of protein and starch in malted weaning foods.** *Journal of Food Science and Technology (India)* 29(4): 1992: 262-263

Roller-drying reduced *in vitro* protein digestibility of weaning foods based on malted/roasted maize/rice and malted cowpea. Cooking of weaning foods improved protein digestibility as compared to uncooked blends. *In vitro* starch digestibility was similar in various blends of cooked weaning foods. Increasing the malted material in weaning foods improved the digestibility of protein, but not the digestibility of starch. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Non-alcoholic beverages

Coffee

2131

Kesavan (PC). **Protection by caffeine against oxic radiation damage and chemical carcinogens: Mechanistic considerations.** *Current Science* 62(12): 1992: 791-797

Caffeine administered after exposure to UV light enhances the damage to cells and organisms by inhibiting photoreactivation, excision and/or recombinational repair. But, if caffeine is already present in the system, it affords remarkable protection not only against O₂-dependent component of radiation damage, but also against chemical carcinogens that require metabolic activation. The possible mechanistic aspects are discussed in this review. KAR

Fruit Juices

2132

Ganesh Kumar (C), Kanawjia (SK), Ladkani (BG) and Singh (S). **Recent advances in the processing of fruit juices.** *Indian Dairyman* 44(4): 1992: 167-179

Biotechnological techniques are increasingly used to get fruit juices which resemble the fresh juice in flavour, aroma, appearance and mouthfeel. Cost efficiency in processing methods: use of enzymes like pectinase, cellulase and hemicellulase in juice processing; nutritional evaluation of processed product; and development of new blended and nutrient fortified beverages with therapeutic value are the aspects considered. 61 references. GS

Apple juices

Apple juice concentrates

2133

Dar (H), Zargar (MY) and Shah (GH). **Effect of processing operations and heat treatment on physico-chemical characteristics and microbiological load of apple juice concentrate.** *Indian Food Packer* 46(1): 1992: 45-50

Apple juice at various stages of processing did not show change in the pH, but acidity increased while concentrating to 71°Brix. Heat treatment of juice at 70 C for 1 h slightly increased total soluble solids due to the evaporation during this process. With the successive operations in concn, clarity increased after enzyme and gelation treatment. The raw juice was dominated by molds followed by yeasts whereas after processing, the yeasts dominated than molds and bacteria. Filtration decreased mold population. Heat treatment at 70 C for 1 h caused a net reduction to 0.68 - 4.6% in bacterial population, 1.03 - 3.23% in yeasts count and 1.19 - 2.44% in mold population, and an overall reduction of 96.9 - 98.8% in total microbial load. In the concn, the bacteria, yeasts and molds were within the range of 0.1/g. Osmophiles were < 100/g in unheated juice and were 1/g in conc. juice. GS

2134

Joshi (VK), Sandhu (DK), Attri (BL) and Walla (RK). **Cider preparation from apple juice concentrate and its consumer acceptability.** *Indian Journal of Horticulture* 48(4): 1991: 321-327

Fortification of apple juice concentrate with diammonium hydrogen phosphate as nitrogen source is essential for rapid fermentation. Must prepared by diluting the concentrate fermented faster than that diluted and ameliorated with sugar. The product prepared from direct dilution of the concentrate was found superior in sensory quality. SRA

Grape juices

2135

Masoodi (FA), Kaur (B) and Kaur (H). **Effect of harvesting dates on the physico-chemical composition and quality of grape juice cv. Perlette.** *Indian Journal of Horticulture* 48(4): 1991: 328-333

Perlette var. grapes cultivated widely in Punjab matures only when the rainy season starts and the juice extracted is not of good quality. Hence, as assessment was made of the quality of juice extracted from Perlette var. grape harvested on 5 different dates starting from 1st to 18th June 1990 and also blending the juice with that extracted from Thompson-Seedless grapes in different proportions. Partial neutralization of the juice of early maturity, blending of Perlette-Thompson seedless grape juice up to 60:40 ratio, and addition of sugar up to 5% improved the early harvested Perlette grape juice quality. SRA

Orange juices

2136

Nisperos-Carriedo (MO), Shaw (PE) and Baldwin (EA). **Changes in volatile flavour components of pineapple orange juice as influenced by the application of lipid and composite films.** *Journal of Agricultural and Food Chemistry* 38(6): 1990: 1382-1387

2137

Kimball (DA) and Norman (SI). **Processing effects during commercial debittering of California navel orange juice.** *Journal of Agricultural and Food Chemistry* 38(6): 1990: 1369-1400

2138

Baker (RA), Crandall (PG), Davis (KC) and Wicker (L). **Calcium supplementation and processing**

variable effects on orange juice quality. *Journal of Food Science* 56(5): 1991: 1369-1371

Untreated, pectinesterase (PE) treated, low pulp, and pectinase treated orange juices were fortified to 20% RDA of Ca with CaCO_3 or $\text{CaPO}_4/\text{lactate}$ (75/25). Neither Ca supplement adversely affected flavour, cloud density, settling pulp, or viscosity in untreated, low pulp, or pectinase treated juices. PE exposed orange juice held 4 h before pasteurization and Ca supplementation had less cloudy density, increased viscosity and more settling pulp. CaCO_3 fortified PE exposed and pectinase treated juices had lower flavour scores, while CaPO_4 suspensions caused slightly lower colour scores of all juices. AS

Orange juice concentrates

2139

Crandall (PG) and Davis (KC). **Viscosity reduction and reformation of structure in orange concentrate as affected by homogenization within commercial taste evaporators.** *Journal of Food Science* 56(5): 1991: 1360-1364

Exp. were undertaken to determine if homogenization would reduce viscosity of bulk orange concentrate during commercial production and if a structure built-up during storage. Homogenizers, installed within two taste evaporators at separate citrus processing plants, were cycled "on" for homogenized samples and "off" for controls. In four replicates, homogenization significantly reduced viscosity to 10% average. Samples were stored for 6 months under tank farm conditions. Structure increased in 5 of 8 samples, but homogenized samples remained significantly lower in viscosity. This confirmed earlier pilot plant results under commercial operations. AS

Passion fruit juices

2140

Shoseyov (O), Bravdo (BA), Siegel (D), Goldman (A), Cohen (S), Shoseyov (L), Ikan (R). **Immobilized endo- β -glucosidase enriches flavour of wine and passion fruit juice.** *Journal of Agricultural and Food Chemistry* 38(6): 1990: 1387-1390

FATS AND OILS

Fats

2141

Sridhar (R) and Lakshminarayana (G). **Triacylglycerol compositions of some vegetable**

fats with potential for preparation of cocoa butter equivalents by high performance liquid chromatography. *Journal of the Oil Technologists Association of India* 23(3): 1991: 42-43

The triacylglycerols (TAG) composition of kokum (*Garcinia indica*), dhupa (*Vateria indica*), sal (*Shorea robusta*), mango (*Mangifera indica*), cocoa (*Theobroma cacao*) and papaya (*Carica papaya*) fats were determined by reversed phase HPLC. Kokum, dhupa, sal and mango TAG contained 85, 72, 76 and 62% of monounsaturated-disaturated glycerides. The papaya TAG contained tri-unsaturated and monounsaturated-diunsaturated glycerides as the major components. The TAG compositions of the indigenous vegetable fats could be useful in their modification into cocoa butter and in the identification of their presence when blended with cocoa butter. SRA

Vanaspati

2142

Shenolikar (I). Nickel content in vanaspati. *Journal of the Oil Technologists Association of India* 23(3): 1991: 48-49

Ni content of vanaspati (hydrogenated fat) collected from market and household was analysed. The mean Ni content of the 25 samples was 1.55 p.p.m. with a range from 0.3 to 4.54 p.p.m. Vanaspati sold in sealed container or as loose did not show any difference in Ni content. Hence, vanaspati contributes negligible amount of Ni to the Indian diet. SRA

Oils

2143

Snyder (JM), Mounts (TL) and Holloway (RK). An analysis scheme for estimation of crude oil quality. *Journal of the American Oil Chemist's Society* 68(5): 1991: 285-288

A seed analysis scheme was designed to rapidly estimate the quality of extracted oil. Factors of crude oil quality evaluated were: free fatty acids, oxidative status (Totox value), colour, and phosphatides (soybean) or wax (sunflower). Soybean and sunflower seeds subjected to extended storage at varying moisture contents were sampled at incremental time periods to yield fifty storage-damaged samples of each oilseed. Oil was extracted from 50 g lots of each samples and analysed for the crude oil quality factors according to standard methods. Alternative instrumental and chemical analyses of the quality factors were correlated with the standard methods. Hexanal

content, measured by headspace-gas chromatographic analysis of the ground full-fat meal, was correlated to the oxidative status. Crude oils recovered by rapid extraction, using sonication, and desolventation were monitored by spectrophotometry for colour correlation. Free fatty acid content was determined by titration methods and monitored by spectrophotometry. Modified turbidimetric methods estimated the phosphatides (soybean) or wax (sunflower seed) contents. The analysis scheme provides for the rapid estimation of oil quality as impacted by various pre- and post-harvest events that cause deterioration of oilseeds. AS

2144

Sebedio (JL), Kaitaranta (J), Grandgirard (A) and Malkki (Y). Quality assessment of industrial prefried french fries. *Journal of the American Oil Chemist's Society* 68(5): 1991: 299-302

An industrial production of prefried french fries using palm oil as a frying medium was studied over a period of 12 days. Samples of oil and french fries were withdrawn once a day. The quality of both the oil and the french fries was assessed using two types of tests. Some tests, such as the detn. of free fatty acid (FFA) and the detn. of thiobarbituric acid value (TBA), oxidfritest and Food Oil Sensor correspond to what was used by a quality control lab. More elaborate techniques such as the detn. of polar components, polymers and cyclic fatty acid monomers (CFAM) were also used. Only small increases of FFA, TBA, polar components and polymers were observed. However, in the case of palm oil, which contains a high percentage of diglycerides, it is more reliable to determine the quality of the oil using the amount of polymers instead of polar components which may include some diglycerides. Thus a high "polar components" value (up to 20-25%) would not necessarily reflect an altered sample. The max. amount of CFAM detected was 0.1% and they did not seem to be preferentially adsorbed on the french fries. These results, along with the sensory evaluations, showed that the french fries obtained in these production conditions were of good quality as far as the fat was concerned. AS

2145

Adlof (RO), Rakoff (H) and Emken (EA). Preparation of deuterium-labelled methyl linoleate and its geometric isomers from natural seed oils. *Journal of the American Oil Chemist's Society* 68(5): 1991: 303-306

Multi-gram quantities of deuterium-labelled methyl linoleate (methyl *cis*-9,*cis*-12-octadecadienoate) and its geometric isomers are readily synthesized from

Crepis alpina (70-80% 12, 13-epoxy-*cis*-9-octadeconic acid) seed oils. Methyl *cis*-9,*cis*-12-*trans*-9,*cis*-12-octadecadienoate-12,13- d_2 were prepared by the Lindlar-catalyzed reduction (with D_2 gas) of methyl *cis*-9- and *trans*-9-octadecen-12-ynoates, respectively. Methyl *trans*-9-octadecen-12-ynoate was synthesized by the *p*-toluene-sulphinic acid-catalyzed isomerization of the corresponding *cis* isomer. Methyl *cis*-9,*cis*-12; *trans*-9,*cis*-12; *cis*-9,*trans*-12- and *trans*-9, *trans*-12-octadecadienoate- d_2 , - d_4 - and d_6 were prepared by the Wittig coupling (with stereochemical control) of the appropriate d_2 , - d_4 - or d_6 -alkyltriphenyl-phosphonium salt with methyl 12-oxo-*cis*-9- or *trans*-9-dodecenoate (prepared by the para-periodic acid cleavage of methyl 12,13-dihydroxy-*cis*-9- or *trans*-9-octadecenoate). The *cis* dihydroxy ester was synthesized from *Vernonia galamensis* seed oil by acetolysis, saponification and then esterification. The *cis* dihydroxy ester was isomerized by nitric acid/sodium nitrite to the *trans* form and purified by silver resin chromatography. Isotopic purities ranged from 88% (for the d_6 isomers) to 99% (for the d_2 isomers). AS

Cottonseed oils

2146

Kapseu (C), Kayem (GJ), Balesdent (D) and Schuffenecker (L). **The viscosity of cottonseed oil, fractionation solvents and their solutions.** *Journal of the American Oil Chemist's Society* 68(2): 1991; 128-130

Cold fractionation of cottonseed oil is made difficult by the high viscosity of the oil. This study was aimed at demonstrating the effect of solvents on the viscosity of mixtures between 0 and 25 C with a view to facilitating the fractionation of refined cottonseed oil. The solvents used were acetone, methylethylketone, methylisobutylketone, hexane and heptane. Measurements of viscosity were carried out by means of a capillary viscometer. The ratio of the viscosity of cottonseed oil to that of pure solvents is of the order of 300. The viscosities of solutions of various ratios of solvent to oil (1/3, 1/1, 3/1) are between those of cottonseed oil and the pure solvents. The effect of the solvent/oil ratio overrides that of solvent nature. The effect of solvent in reducing the viscosity of cottonseed oil is by descending order: acetone, hexane, methylethylketone, heptane, methylisobutylketone. AS

Rice bran oils

2147

Adhikari (J) and Adhikari (S). **Semi-quantitative detection of rape-mustard oil in rice bran oil.** *Journal of the Oil Technologists Association of India* 23(3): 1991; 50-52

The % of erucic, eicosenoic and linolenic acids can detect semi-quantitatively the proportion of Indian rape-mustard oil when present in rice bran oil. Fatty acid analysis of 22 Indian rape/mustard oil drawn from different seed var. and market samples were carried out. At 10% level of admixture or adulteration, the % would be 5.0 for erucic acid (22:1), 0.7 for eicoenoic acid (20:1) and 1.7 for linolenic acid (18:3). At 20% level, these % would be 10.0, 1.4 and 2.7 respectively. SRA

Soybean oils

2148

Palaniappan (S) and Proctor (A). **Evaluation of soy oil lutein isotherms obtained with selected adsorbents in hexane miscellas.** *Journal of the American Oil Chemist's Society* 68(2): 1991; 79-82

Bleaching of soy oil hexane/miscellas by adsorption of the lutein was examined. Quantitative differences in the adsorption behaviour between a bleaching clay, alkaline rice hull ash and acid rice hull ash were measured by comparing the constants, *K* and *n*, of Freundlich isotherms. All the isotherms were dose-dependent with *K* being inversely related and *n* directly related, to adsorbent mass. Overall, the bleaching clay performed better than the ashes. Alkaline ash had a larger *K* value than acid ash, but the *n* value of acid ash was greater. Equations of lutein adsorption were derived based on initial concn. on lutein and the amount adsorbed/g. Logarithmic plots produced constants, K^1 and n^1 , which were the intercept and slope, respectively. As adsorbent dose increased, K^1 decreased and n^1 increased for each adsorbent studied. These findings may have applications in the processing of dilute miscellas where low temp., low viscosity oil refining is desired. AS

2149

Schnepf (M), Spencer (G) and Carlat (J). **Chemical and sensory characteristics of stored menhaden oil/soybean oil blends.** *Journal of the American Oil Chemist's Society* 68(5): 1991; 281-284

The purpose of this study was to determine the feasibility of increasing the consumption of dietary ω -3 fatty acids by incorporating menhaden oil into a French-type salad dressing. Menhaden/soybean oil blends of 10, 20 and 30% menhaden oil (w/w) were used to prepare an emulsified French salad dressing. The oil blends and salad dressings were stored at 22 C in the dark for 20 wk. The fatty acid

profile, peroxide value, and anisidine value were determined. The salad dressings also were evaluated by a sensory panel for flavour, aroma and aftertaste. The ω -3 fatty acids were stable over time under these storage conditions. Peroxide values rose slowly and consistently over time reaching higher values when more menhaden oil was added. Peroxide values were also higher in the oil blends which were stored with air in the headspace and not flushed with argon. Anisidine values also were higher with each addition of menhaden oil but did not change over time except for the 100% menhaden oil which was stored in air. After 8 wks the sensory panel rated the salad dressing which contained menhaden oil as lower than the ones which did not contain menhaden oil. While a significant amount of ω -3 fatty acids may be incorporated into foods by the addition of menhaden oil, the development over time of off-flavours must be controlled. AS

2150

Covey (JE) and Wan (PJ). **Hydrogenation of oxidized soybean oil.** *Journal of the American Oil Chemists Society* 68(5); 1991; 337-338

Portions of refined and bleached soybean oil were stored at various temp. for various lengths of time, then hydrogenated to 70 iodine value (IV) to find the effect of peroxides on the rate of hydrogenation and on characteristics of hydrogenated product. Samples were treated up to 3 wk at up to 65 C and provided samples with peroxide values (PV) of up to 358. All samples were analyzed, hydrogenated and reanalyzed. Peroxides affected the fatty acid composition as determined by gas chromatography, the calculated iodine value based on fatty acid composition, and rate of hydrogenation. Peroxides also affected the selectivity of hydrogenation and slope of the solids curve in hydrogenated products. AS

Sunflower oils

2151

Semwal (AD) and Arya (SS). **Storage stability of refined sunflower oil in tins and HDPE bottles.** *Journal of Food Science and Technology (India)* 29(4); 1992; 250-252

Refined sunflower oil remains stable for 2 yr at room temp. when stored in high density polyethylene (HDPE) bottles and sealed tins without development of perceptible off-flavour or odours. Peroxide, TBA, total carbonyls and anisidine values increased during storage and the changes correlated linearly with the storage period. Increases in these values were more in leaking containers. AS

SPICES AND CONDIMENTS

2152

Carbonell (ES). **Extraction of flavours with supercritical carbon dioxide.** *Cereal Foods World* 36(11); 1991; 935-937

Flavour extraction with supercritical CO₂ results in excellent flavour characteristics with other products such as spices because of the low temp. and inert atm. involved and the potential selection of specific aroma fractions, extractions of spices and hops, ranges of solubility for CO₂, method of extraction, plant operations, examples of extraction of spices and flavours (ginger, pepper and vanilla) and dealcoholization of beverages are the aspects covered. BV

2153

Amita Srivastava and Jain (PC). **Seed mycoflora of some spices.** *Journal of Food Science and Technology (India)* 29(4); 1992; 228-230

Survey of fungal contaminants of bishopweed, black pepper, coriander and cumin from Sagar district of Madhya Pradesh, India showed occurrence of *Aspergillus flavus*, *A. niger*, *A. ochraceus*, *Penicillium*, spp., *Rhizopus arrhizus*, *R. stolonifer* and *Syncephalastrum racemosum*. However, their frequency varied widely. Samples of test spices yielded slightly lower fungal species with the use of spice extract agar medium as compared to malt-salt agar. AS

Pepper

2154

Gopalakrishnan (N) and Thomas (PP). **Studies on colour retention in pepper subjected to different treatments.** *Journal of Food Science and Technology (India)* 29(4); 1992; 256-257

Fresh pepper (*Piper nigrum* L.) was subjected to treatments such as microwave exposure, microwave exposed boiling water blanching and direct boiling water blanching to study the extent of green colour retention. The variation in the chlorophyll content at different stages was insignificant among the samples subjected to the same treatment. The best colour retention was observed in the microwave exposed boiling water blanched samples. AS

2155

Kuchiba-Manabe (M), Matoba (T) and Hasegawa (K). **Sensory changes in umami taste of inosine 5'-monophosphate solution after heating.** *Journal of Food Science* 56(5); 1991; 1429-1432

Discrimination in umami taste of inosine 5'-monophosphate (IMP) sol. caused by thermal degradation was investigated by sensory evaluation. The difference threshold of umami taste of 0.005% IMP sol. in the presence of 0.05% monosodium glutamate was 0.002%. The difference threshold of a 0.005% IMP sol. decreased by about one half when heated at 95 C for 15 h. Inosine, one of the main products of the thermal degradation of IMP, had a bitter taste. The detection threshold of inosine varied widely among panelists. Heating a 0.005% IMP solution at 95 C for 15 h formed inosine at about one tenth of its lowest detection threshold. AS

2156

Nunes (RV), Rhim (JW) and Swartzel (KR). **Kinetic parameter evaluation with linearly increasing temperature profiles: Integral methods.** *Journal of Food Science* 56(5); 1991; 1433-1437

Two integral methods for kinetic parameter estimation with linear temp. profiles were tested using simulated and experimental data sets. They were the second rational approximation method (SRAM) and the equivalent point method (EPM) using least squares nonlinear regression (LSNR) and weighed least squares nonlinear regression (WLSNR). For three simulated data sets, the SRAM with WLSNR yielded accurate parameter estimation. For the experimental data set, both SRAM and EPM using WLSNR yielded accurate parameter estimation. The standard error in activation energy were 37.3% (for SRAM) and 46.7% (for EPM) lower than that of the differential method. The SRAM and WLSNR was the best parameter estimation procedure. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

Nil

Nil

TOXICOLOGY

2157

Lewerenz (H-J), Mieth (G), Bleyl (DWR), Plass (R) and Elsner (A). **Toxicological evaluation of sucrose carbonic acid esters in subchronic feeding studies in rats. Part 2. Effect of sucroacetoglycerides.** *Die Nahrung* 35(6); 1991; 655-662 (De)

Groups of male and female rats received a sucroacetoglycerides containing product (SAG) for 3 months at dietary levels of 0, 2.5, 5 and 10%. Food consumption was initially increased in females at all SAG-levels. After two wks significant increases in food intake were observed in males and females fed 10% SAG throughout the feeding period. The serum analysis revealed significantly elevated activity in serum alkaline phosphatase at the highest SAG-level in males and females after 6 wks and in females after 13 wks. Histological changes related to the SAG-feeding were noted in the intestinal lymph nodes of male and female animals fed 10% SAG. The no-adverse effect level established in this subchronic feeding study was 5% SAG in the diet of rats, equivalent to a daily intake of 3.6 g/kg body wt. in males and 4.0 g/kg in females. AS

2158

Choudhary (DN), Sahay (GR) and Singh (JN). **Effect of some mycotoxins on reproduction in pregnant albino rats.** *Journal of Food Science and Technology (India)* 29(4); 1992; 264-265

Effect of oral administration of aflatoxin B₁, patulin and kojic acid on reproductive performance of pregnant rats showed significant anti-implantational activity. Patulin and kojic acid exhibited significant abortifacient activity. A significant loss of viability among the litters was also noticed in mycotoxin fed rats except for those fed with patulin. AS

FOOD LAWS AND REGULATIONS

Nil

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GENERAL

2159

Pal (S). **Agricultural exports of India: Issues of growth and instability.** *Indian Journal of Agricultural Economics* 47(2); 1992; 185-194

This study examines (i) the magnitude of growth and instability in agricultural exports, (ii) the determinants of the exports of agricultural products, and (iii) the causes of instability in export earning. The study is based on time series secondary data pertaining to the period 1970 to 1989. The data for principal agricultural export products and product aggregates for India and the world were compiled from FAO Trade Year Book. Data on domestic wholesale price indices and net national product were taken from Agricultural Prices in India and Economic Survey, respectively. The study reveals that the export of agricultural products was constrained by the increasing domestic demand. Further, the volatile world prices and policy changes have induced a very high degree of instability in the export earnings from important agricultural products. The results failed to establish any relationship between the nature of product, growth and instability in exports. KAR

FOOD PROCESSING

Nil

FOOD PACKAGING

Nil

FOOD ENGINEERING AND EQUIPMENT

2160

Pham (QT). **Shape factors for the freezing time of ellipses and ellipsoids.** *Journal of Food Engineering* 13(3); 1991; 159-170

By assuming that the freezing front is similar in shape to the surface, an expression is obtained for the shape factors of ellipses and ellipsoids. This expression agreed well with numerical results for the case of infinite Biot number but disagreed by up to 17% for intermediate Biot numbers. A curve-fitting expression is proposed that agrees with numerical results to within 6%. AS

2161

Paul Singh (S), Srivastava (AK) and Steffe (JF). **Vibration induced settling of a sphere in a Herschel-Bulkley fluid.** *Journal of Food Engineering* 13(3); 1991; 181-197

Settling of spheres suspended in a Herschel-Bulkley fluid with a yield stress under the influence of vibrations is of great practical significance while transporting liquid food systems such as soups, sauces and jams. A dimensionless equation has been developed to predict the settling time of a sphere in a Herschel-Bulkley fluid subjected to sinusoidal vibration. The model was used to determine the effect of random vibrations as induced in a shipping environment. A separation criterion has been developed to determine whether a particle will settle. Methods described in this paper can also be used to characterize non-Newtonian fluids. AS

2162

Marcotte (M), Toupin (CJ) and Maguer (ML). **Mass transfer in cellular tissues. Part I: The mathematical model.** *Journal of Food Engineering* 13(3); 1991; 199-220

The kinetics of equilibration of a biological structure with osmotic sol. were studied based on the internal cellular structure of the plant material. The model developed by Toupin was used to describe the mass transfer of sucrose and water in potato material. This model was modified to give a closer thermodynamical description of the forces involved in the osmotic process. The model was used to simulate movement of water and sucrose in potato tubers. AS

2163

Yeo (H) and Shibamoto (T). **Effects of moisture content on the Maillard browning model system upon microwave irradiation.** *Journal of Agricultural and Food Chemistry* 39(10); 1991; 1860-1862

Browning intensities of an L-cysteine/D-glucose model system with different moisture content (MC) (0 - 40%) upon microwave irradiation for 2.5 min at the high setting of a 700-W microwave oven were measured by a UV spectrophotometer at 420 nm. The volatile compounds generated were analyzed by GC and MS. Max. browning intensity occurred at approx. 14% moisture. The effects of irradiation time for each of the MC (14, 22 and 26%) were also investigated. For these MC, browning increased with irradiation time until reaching a plateau at 2.5 min of irradiation. The MC appeared to determine the browning intensity at the initial stage of exposure to microwave irradiation. The max. number of volatiles was produced at 11% moisture. Major compounds obtained from this model system

were 2-thiophenethiol, 2,3-dihydro-3,5-dihydroxy-6-methyl-4H-pyran-4-one, and 2-acetylfuran. AS

2164

Kanawjia (SK), Pathania (V) and Singh (S). **Microencapsulation of enzymes, microorganisms and flavours and their applications in foods.** *Indian Dairyman* 44(6): 1992; 280-287

The advantages of microencapsulation technique in preserving the sensory attributed have been delineated. Phase separation method, interfacial polymerization method, liquid drying method and liquid surfactant membrane method are described under microencapsulation of enzymes. Microencapsulation of *B. pseudolongum* is described in detail and a brief description about encapsulation of *Tetrahymena pyriformis* and *Escherichia coli* is given. Spray drying is the method described for microencapsulation of flavours. The review ends with a note on food application of microencapsulation technique. KAR

2165

Fuchs (M), Kluge (S), Ruter (M), Wolff (E) and Piringer (O). **Global migration determination and sensory evaluation of microwaveable materials coming into contact with food (Part I).** *Deutsche Lebensmittel-Rundschau* 87(9): 1991; 273-276 (De)

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

2166

Lovaas (E). **Antioxidative effects of polyamines.** *Journal of the American Oil Chemist's Society* 68(6): 1991; 353-358

The antioxidative effects of spermine, spermidine and putrescine were determined by measurement of primary and secondary oxidation products of polyunsaturated fatty acids (PUFAs), using gas and liquid chromatography as well as spectrophotometric recordings. It was demonstrated that polyamines inhibit the oxidation of PUFAs, α -tocopherol and carotenoid pigments. Both linear and nonlinear dose/response relationships have been observed. The efficiency of

a given polyamine was correlated with the number of amine groups in the mole. Spermine was, thus, more efficient than spermidine, which in turn had a higher efficiency than putrescine. The relative antioxidative effect was as follows: spermine (100.0), spermidine (61.0), putrescine (23.0), ethoxyquin (27.6), ascorbyl palmitate (18.3), octyl gallate (7.9), TBHQ (6.3), BHA (3.6) and α -tocopherol (3.4). AS

Chemistry (Analytical)

2167

Andrikopoulos (NK), Brueschweiler (H), Felber (H) and Taeschler (Ch). **HPLC analysis of phenolic antioxidants, tocopherols and triglycerides.** *Journal of the American Oil Chemist's Society* 68(6): 1991; 359-364

Triglycerides, together with 9 synthetic phenolic antioxidants most commonly used to prevent oxidation of edible oils and fats, as well as the natural antioxidants tocopherols and α -tocopherol acetate, were separated by HPLC by means of a reversed phase C₁₈-column and gradient elution with water/acetonitrile/methanol/isopropanol. Besides dilution of the oil with isopropanol/hexane, no further sample preparation was required. UV detection was applied. The synthetic antioxidants propyldodecylgallate, octyldodecylgallate, dodecylgallate, 3-tert-butyl-4-hydroxyanisole, tert-butylhydroquinone, 3,5-di-tert-butyl-4-hydroxytoluene, 2,6-di-tert-butyl-4-hydroxymethyl-phenol, 2,4,5-trihydroxybutyrophenone and nordihydroquaiaretic acid, as well as α - and δ -tocopherol and α -tocopherol acetate were base-line separated; β - and γ -tocopherol, however, eluted together. The triglycerides, detected at $\lambda = 215$ nm, were separated according to their partition number. The absorption at $\lambda = 215$ nm revealed saturated and unsaturated triglycerides. The absorption at $\lambda = 280$ nm indicated triglycerides with conjugated unsaturation, relating information about refining and heat treatment of the oil. Oxidized unsaturated triglycerides showed absorption at $\lambda = 230$ nm. Triglycerides of ricinoleic acid, a hydroxymonounsaturated acid, gave identical UV spectra. The simultaneous detection of antioxidants and triglycerides may be used to study inhibition effects by antioxidants in oils. AS

2168

Cameron (RG), Buslig (BS) and Shaw (PE). **Adaptation of a spectrophotometric assay for pectinmethylesterase to a kinetic microplate reader.** *Journal of Food Science* 57(4): 1992; 1006-1008

A continuous spectrophotometric assay for pectinmethylesterase (PME) has been adapted to a kinetic microplate reader. Linear standard curves could be constructed from 0 to 50 nMol galacturonic acid and remained linear for 15 min. Activity estimates from commercial orange peel PME were accurate from 0.009 to 0.015 units. Comparison of microplates with differing protein binding efficiencies indicated that low and medium binding plates showed significantly higher activity levels than high binding plates. The utility of the assay was demonstrated on 2 commercial mixtures of pectolytic enzymes and 2 commercial PMEs. The assay is extremely rapid; 24 samples replicated 3 times each could be performed in < 1 h. Additionally, it requires very small volumes of substrate (final vol. per well was 200 μ L) and sample (< 10 μ L per well). AS

2169

Weisshaar (R). **Improved method for the determination of ^{89}Sr and ^{90}Sr in food.** *Deutsche Lebensmittel-Rundschau* 87(5): 1991; 142-144 (De)

A new method for the detn. of ^{89}Sr and ^{90}Sr in food is presented. For that purpose, Ca and strontium are precipitated as oxalates, transferred into chlorides and dissolved in an excess of EDTA at pH 10 - 11. The excess of EDTA is removed by titration with ZnSO_4 . Ba^{++} is added as indicator. At the endpoint no more excess of EDTA is present and BaSO_4 precipitates. After this, a slight excess of ZnSO_4 is added and SrSO_4 precipitates, while Ca completely remains in sol. After separation of barium, a SrSO_4 measuring prepate is made and used for beta counting and calculation of ^{89}Sr - and ^{90}Sr -activities. The method agrees very good with the classical nitric acid method, but it is less time consuming and avoids handling with fuming nitric acid. AS

2170

Brauer (B) and Funke (T). **Determining primary aromatic amines in migratory solutions.** *Deutsche Lebensmittel-Rundschau* 87(9): 1991; 280-281 (De)

Primary aromatic amines, being able to migrate from plastics into foodstuffs, can be tested as a sum by an official method. The amines available in an aqueous food simulant are coupled to an azo dye, and the content is determined photometrically. The official procedure is improved with regard to sensitivity by the method described. In addition to the official procedure it contains a preconcentration of the hydrophobic azo dye to C18 solid phase extraction columns. The method is validated for the food simulants deionized water, 3% acetic acid and 10% ethanol. AS

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

2171

Leuchtenberger (A). **Current facilities of enzyme application in food production. Part II. Special application fields.** *Ernährungsforschung* 36(1): 1991; 12-13 (De)

Some special fields of application which make necessary the use of single or combined enzyme preparations are the isolation or intensification of aroma and taste substances, the production of protein hydrolysates for special dietary and therapeutic preparations as well as the preservation of foods (extraction of essential nutrients, formation of antiseptic compounds, degradation of microbial cell walls, use of killer enzymes). AS

Microorganisms

2172

Knabel (SJ), Walker (HW) and Hartman (PA). **Inhibition of *Aspergillus flavus* and selected gram-positive bacteria by chelation of essential metal cations by polyphosphates.** *Journal of Food Protection* 54(5): 1991; 360-365

A simple well-plate technique was utilized to determine the effect of various metals on the growth of microorganisms in media containing different polyphosphates. *Aspergillus flavus* and 4 gram-positive bacteria were completely inhibited by media containing 1% of various alkaline polyphosphates, whereas 4 gram-negative bacteria were not. Significant differences were observed between the type of polyphosphate added, the type of metal added, and the species of gram-positive bacterium inhibited. The addition of Mg^{2+} stimulated growth of *A. flavus* and *Bacillus cereus* in the presence of tetrasodium pyrophosphate, whereas Mn^{2+} permitted growth of *A. flavus* and *Staphylococcus aureus* in the presence of sodium hexametaphosphate. Iron supplementation allowed the growth of *S. aureus* and *Listeria monocytogenes* on media containing 1% tetrasodium pyrophosphate. A method for determining the amount of Ca and Mg in water was modified to detect free Mg^{2+} by replacing EDTA with phosphate. The addition of free Mg^{2+} , but not Mg^{2+} chelated by tetrasodium pyrophosphate, permitted the growth of *B. cereus* on a medium containing tetrasodium pyrophosphate. It is speculated that polyphosphates specifically inhibited *A. flavus* and gram-positive bacteria by removing essential metals

from cation-binding sites located within their cell walls. AS

2173

Byrne (RDJr) and Bishop (JR). **Evaluation of a dry medium culture plate (3M Petrifilm AC) for laboratory pasteurized counts.** *Journal of Food Protection* 54(4): 1991: 308-309

In this study Petrifilm AC was evaluated for its ability to enumerate thermophilic bacteria in raw milk by the laboratory pasteurized count (LPC). LPC's were conducted on agar pour plates and Petrifilm plates. Both plating techniques were conducted immediately following laboratory pasteurization, and plating was also conducted after incubations of 2 and 4 h at room temp. Uninoculated raw milk samples, raw milk inoculated with *Bacillus cereus*, *Micrococcus luteus* and raw milk isolates (*Streptococcus*, *Corynebacterium*, and *Micrococcus* sp.) were enumerated. A total of 270 samples was analyzed. Uninoculated raw milk samples and raw milk samples inoculated with *B. cereus*, *Corynebacterium*, *Streptococcus*, and some *Micrococcus* sp. showed no significant difference between agar pour plates and petrifilm AC. Other *Micrococcus* species were recovered at lower numbers on the Petrifilm after laboratory pasteurization. Some of these were comparable to the agar plates after a 4-h incubation at room temp. This study indicates that Petrifilm AC could be used in place of agar pour plates to conduct the LPC. AS

Bacteria

Aeromonas

2174

Ramteke (PW), Pathek (SP) and Bhattacharjee (JW). **Incidence of *Aeromonas* in total coliform test.** *Indian Journal of Microbiology* 32(2): 1992: 193-196

Drinking water samples (341) collected from different districts of N. India were analysed for total coliforms and recovery of coliform sp. and *Aeromonas* in multiple tube test. *Escherichia coli* and *Aeromonas* formed 12.4% and 32.6% of total coliforms identified. The presence of aerogenic *Aeromonas* elevated the total coliform concn. in drinking water. The authors stress the importance of determining the *Aeromonas* in the total coliform test as the *Aeromonas* proved to be an important pathogen in a variety of infections in humans. GS

Bacillus cereus

2175

Harmon (SM) and Kautter (DA). **Incidence and growth potential of *Bacillus cereus* in ready-to-serve foods.** *Journal of Food Protection* 54(5): 1991: 372-374

To simulate temp. abuse, 106 test portions of ready-to-serve moist foods, 12 test portions of rehydrated powdered infant formula, and 18 test portions of nonfat dry milk were incubated for 20 and 24 h at 26 C, and then examined for *Bacillus cereus*. Of the ready-to-serve moist foods, 88 of 106 were positive for *B. cereus* at levels ranging from 0.25 to 8.5×10^6 /g after 20 h of incubation and from 0.1 to 58×10^6 /g after 24 h. All the powdered milk and 12 of the 15 units of infant formula, representing 5 brands, were positive, with counts ranging from 0.15 to 5.0×10^6 /g in 20 h and 5.0 to 49×10^6 after 24 h. *B. cereus* counts in the powdered products were low, ranging from 0.09/g for one of two soy-based products to an average of 0.29/g for milk-based products. However, these levels were sufficient to initiate growth of *B. cereus* in almost every 2-oz serving. Similar results were obtained for rehydrated nonfat milk, with initial *B. cereus* counts ranging from 0.29 to 1.5/g; at 26 C the counts averaged 3.3×10^7 after 20 h and 5.5×10^7 after 24 h. Counts ranged from 2.0×10^4 to 1.1×10^5 after 9 h in milk and were in excess of 10^6 /g after 10.5 h. AS

2176

Szabo (RA), Speirs (JI) and Akhtar (M). **Cell culture detection and conditions for production of a *Bacillus cereus* heat-stable toxin.** *Journal of Food Protection* 54(4): 1991: 272-276

In rice, milk, and brain-heart-infusion cultures, 17 of 67 *B. cereus* strains produced a heat-stable toxin causing morphological changes in culture cells. All of the positive strains were associated with illness, 8 with the emetic syndrome. Time-temp. studies indicated that toxin production was optimum at 25 to 30 C after 18 h in shaking culture, but low levels were produced at 15 C. Effects in cells included granulation, vacuole formation, cell rounding, acid production, and arrested cell multiplication. Of 7 cell lines tested, Int 407, CHO, and HEp-2 were equally the most sensitive with the former being preferred for ease of interpreting results. The observed toxin had a mol. wt. of about 14,000 and a pI of 5.9 as determined by Superose 12 chromatography and Mono P ion-exchange chromatofocusing, respectively. AS

Clostridium botulinum

2177

Okereke (A) and Montville (TJ). **Bacteriocin inhibition of *Clostridium botulinum* spores by**

lactic acid bacteria. *Journal of Food Protection* 54(5): 1991: 349-353, 356

Twenty-three strains of lactic acid bacteria were tested by deferred antagonism methods for bacteriocin-like activity against types A and B spores from 11 proteolytic and nonproteolytic *Clostridium botulinum* strains. *Pediococcus pentosaceus* ATCC 43200, *P. pentosaceus* ATCC 43201, *Lactococcus lactis* subsp. *lactis* ATCC 11454, *Lactobacillus acidophilus* N2, *L. plantarum* LB75, *L. plantarum* LB592 and *L. plantarum* BN exhibited bacteriocin-like inhibition of all *C. botulinum* strains tested. By excluding inhibition due to hydrogen peroxide, acid, and lytic phage and confirmed their proteinaceous nature, the inhibitors were confirmed as bacteriocins. The min. inhibitory cell concn. (MICC) required to produce 1 mm radius inhibition zones were determined by direct antagonism testing. Only strains 43200, 43201, 11454, and N2 were inhibitory when cultured simultaneously with the botulinum spores. The MICCs of strains antagonistic to *C. botulinum* spores by simultaneous testing ranged between 1.6×10^5 and 4.7×10^7 CFU/ml. Based on the MICCs, *P. pentosaceus* 43200 was most inhibitory to *C. botulinum*. AS

Escherichia coli

2178

Hsü (H-Y), Chan (SW), Sobell (DI), Halbert (DN) and Groody (EP). **A colorimetric DNA hybridization method for the detection of *Escherichia coli* in foods.** *Journal of Food Protection* 54(4): 1991: 249-255

A colorimetric DNA hybridization assay has been developed for the rapid detection of *E. coli* in foods. The method employs two oligonucleotide probes which are specific for the 16S ribosomal RNA of *E. coli*. Probes are added to lysates of test cultures and allowed to hybridize to target rRNA if present. The probe-target complex is captured via hybridization to a polystyrene dipstick. The immobilized target is detected using an antibody complex generates a colorimetric signal when exposed to a substrate/chromogen mixture. A total of 233 *E. coli* isolates representing typical, toxigenic, invasive, hemorrhagic serotype O157:H7, and other pathogenic strains all resulted in a positive assay signal. Dose-response experiments indicate the sensitivity of the assay is approx. 1×10^6 CFU/ml. Specificity of the assay was determined by testing 207 strains of non-*E. coli* species at 10^9 CFU/ml. All of the non-*E. coli* organisms tested were negative with the exception of *E. fergusonii* and *Shigella* sp. A total of 345 enriched samples including uninoculated and naturally-contaminated foods was tested for the presence of *E. coli* by the hybridization assay and the

conventional cultural method. The false-negative rate for the hybridization assay was 1.2%. By comparison, the false negative rate for the culture method in these studies was 23.4%. Based on these data, the DNA hybridization method is significantly more accurate than conventional methods for the detection of *E. coli* in foods. AS

Listeria monocytogenes

2179

Evason (DJ), Klatt (MJ), Donlevy (TP) and Flowers (RS). **Agar-based 24-H method for presumptive identification of *Listeria monocytogenes*.** *Journal of Food Protection* 54(5): 1991: 370-371

A rapid system for the presumptive identification of *L. monocytogenes* was developed using agar-based media in place of conventional liquid media. The system allows detn. of oxidase, catalase, rhamnose and xylose fermentation and CAMP reaction within 24 h. A single four-section compartmented petridish was prepared containing purple agar base with xylose, purple agar base with rhamnose, trypticase soy agar with yeast extract (TSA/YE), and TSA/YE with 5% sheep blood. All four media and a 10-ml portion of brain heart infusion broth, to examine motility, were inoculated simultaneously from a single colony for presumptive identification. A 100% correlation between conventional procedures requiring 7 days and the rapid system was demonstrated on 935 *L. monocytogenes* cultures isolated from food and food plants. The rapid screening test was also useful in differentiating other *Listeria* spp. AS

Streptococcus cremoris

2180

Sridhar (N) and Dutta (SM). **Immobilization of β -galactosidase of *Streptococcus cremoris* (H).** *Indian Journal of Dairy Science* 44(8): 1991: 514-518

β -Galactosidase of *S. cremoris* (H) was immobilized on porous glass beads. Higher activity yield was recorded with porous glass beads having a pore diam. of 350-400Å. A linear relationship was observed between the amount of enzyme immobilized and the enzyme used for immobilization. The optimum temp. for the immobilized enzyme was found to be 50 C. The immobilized enzyme was found to be stable over a wide pH range (5-9). The immobilized enzyme beads packed in a column exhibited a hyperbolic relationship between the flow rate and hydrolysis of ONPG. Apparent Km value for the immobilized enzyme with ONPG as the substrate was observed to be 4mM and with lactose it was found to be 38mM. AS

Fungi

Aspergillus

2181

Thompson (DP). Effect of butylated hydroxyanisole on conidial germination of toxigenic species of *Aspergillus flavus* and *Aspergillus parasiticus*. *Journal of Food Protection* 54(5): 1991; 375-377

The fungitoxic effect of BHA on germination of conidia from 7 toxigenic strains of *Aspergillus* was examined on potato dextrose agar (PDA). At concn. of 200 µg/ml and above, BHA prevented germination of conidia in all of the test fungi after 24 and 48 h of incubation. On the other hand, at 100 µg/ml BHA reduced the rate of germination. When an impregnated disk assay was employed, distinct inhibition zones were observed at 200, 400, 800 and 1000 µg/disk of BHA after 24 h of incubation. After 48 h of incubation, distinct inhibition zones were still observed at 800 and 1000 µg/disk. AS

Mushrooms

2182

Khanna (PK), Bhondari (R), Soni (GL) and Garecha (HS). Evaluation of *Pleurotus* spp. for growth, nutritive value and antifungal activity. *Indian Journal of Microbiology* 32(2): 1992; 197-200

Six *Pleurotus* sp. (*P. florida*, *P. fossulatus*, *P. flabellatus*, *P. pulmonarius*, *P. eryngii* and *P. columbinus*) were cultivated on wet wheat straw during winter. The biological efficiency (fresh wt. of fruits divided by dry wt. of straw and multiplied by 100) of these sp. ranged from 12.5 to 72.4%, with max. in case of *P. florida* and min. in *P. eryngii*. All the sp. were rich in protein (26.97 - 31.96%), carbohydrates (44.76 - 53.30%) and minerals (8.7 - 10.9%). The fat content of all the sp. was low (5.4 to 8.0%). *In vitro* digestibility of the *Pleurotus* fermented straw (spent straw) was 4 - 12% more than unfermented except in case of *P. fossulatus* and *P. eryngii* fermented straw, where the corresponding values were lower. The culture filtrates of *Pleurotus* sp. showed antifungal activity against seven common competitor molds of white button mushroom. GS

Yeasts

Kluyveromyces lactis

2183

Pivarnik (LF) and Rand (AG). Assay conditions effect on β -galactosidase activity from *Kluyveromyces lactis*. *Journal of Food Science* 57(4): 1992; 1020-1021

β -Galactosidase, derived from *K. lactis* was assayed for activity using lactose, buffered at pH 6.5 with 0.02M potassium phosphate, and reconstituted non-fat dry milk (NFDM) substrates. Variations in buffer strength, potassium ion concn. and water quality were evaluated. Assay under similar conditions using NFDM and buffered lactose resulted in 4.3 and 6.6 units of activity, respectively. Increasing buffer strength to 0.1M potassium phosphate resulted in a 20% decrease in lactase activity units. Addition of potassium ions, as 0.5M KCl, in the enzyme preparation resulted in an increase in observed activity using both assay systems with a greater impact (160% increase) using NFDM vs buffered lactose (120% increase) as the substrate. AS

Hygiene

2184

Overdahl (BJ) and Zottola (EA). Evaluation of selected sanitizers to control bacteria in a simulated sweet water coolant system. *Journal of Food Protection* 54(4): 1991; 305-307

Three types of sanitizers commonly used in dairy processing plants were evaluated at varying concn. and at 25 and 4 C for their ability to control potential spoilage and pathogenic bacteria in water. Test organisms included *Pseudomonas fluorescens*, *Staphylococcus haemolyticus*, and *Bacillus* spp. These had been isolated from samples of sweet water coolants collected in a previous national survey in grade A dairy plants. *S. haemolyticus* required 10 p.p.m. chlorine, 12.5 p.p.m. iodine, or 10 p.p.m. quaternary ammonium compound (QAC) to reduce the population > 99% at 25 C. At 4 C, however, only 93% of the population of *S. haemolyticus* was reduced with the 10 p.p.m. QAC. Concn. of 25 p.p.m. chlorine, 2.5 p.p.m. iodine, or 20 p.p.m. QAC reduced the *P. fluorescens* population > 99% at both 25 and 4 C. The *Bacillus* spp. was reduced > 99% at concn. of 10 p.p.m. chlorine at 25 and 4 C, 2.5 p.p.m. iodine at 25 C, and 10 p.p.m. QAC at both temp. At 4 C, 2.5 p.p.m. iodine reduced the *Bacillus* population to only 93%. All 3 organisms were reduced > 90% at both test temp. with concn. of 25 p.p.m. chlorine, 12.5 p.p.m. iodine, or 20 p.p.m. QAC. AS

BIOTECHNOLOGY

2185

Kaimal (TNB). **Biotechnology: Why, how... and so what ?**. *Journal of the Oil Technologists Association of India* 23(4): 1991; 66-75

Alternate sources of oil from yeasts, microbes, fungi and microalgae are reviewed. Major lipids identified are oleic, palmitic and linoleic acids from fungi; triacylglycerols from oleaginous yeasts; and β -carotene from algae. Enzyme catalyzed modification of oils: asymmetric synthesis and kinetic resolution of racemates; chemical modification of porcine pancreatic lipase; microbial production of dicarboxylic acid and chiral epoxides; and production of acrylamide from acrylonitrile using bacteria are considered. GS

TISSUE CULTURE

Nil

FOOD ADDITIVES

Colourants

2186

Roy (AK) and Chakrabarti (J). **Added colours in foodstuffs from Calcutta markets**. *Science and Culture* 57(1/2): 1991; 40-41

More than 1000 samples of sweetmeats, flattened rice, cereal and pulse products, confectionery, fish, vegetables, cut-fruits, milk and milk products, velpuri, turmeric powder and egg (shell) were analysed by existing methods of Pearson, AOAC, Guha and the Association of Public Analysts England and Woll dyeing technique with some modifications and the colouring matters were established. The method of analysis is improved to remove interfering substances like fatty substances, sugar and caseinous matter; to transfer of colour from aqueous to non-aqueous phase; suspecting basic and oil soluble colours from their solubility in extractant before acidification. SD

Preservatives

2187

Kalra (MS), Matta (H) and Ajit Singh. **Nisin as an aid in extending shelf-life of various foods**. *Indian Food Packer* 46(2): 1992; 5-15

The use of nisin as a preservative in various foodstuffs - hard processed cheeses, pasteurized and sterilized milks and milk products, canned foods, meat, alcoholic beverages and fruits is reviewed. The properties of nisin and its mode of action are described. The controversy regarding the toxic effect of nisin is also discussed. 73 references. GS

CEREALS

Barleys

2188

Zawistowski (J), Ansell (M), Zawistowska (U) and Howes (NK). **A monoclonal antibody to endogenous α -amylase inhibitor of barley**. *Journal of Cereal Science* 15(1): 1992; 1-4

Reports the production of a highly specific monoclonal antibody (4F10-5, IgG₁) to barley endogenous α -amylase inhibitor, which could be used to develop a quantitative assay to screen for the presence of the inhibitor in barley varieties. BV

2189

Guerin (JR), Lance (RCM) and Wallace (W). **Release and activation of barley β -amylase by malt endopeptidases**. *Journal of Cereal Science* 15(1): 1992; 5-14

Cysteine-endopeptidases, purified from malt and 2-mercaptoethanol (2-ME), mediated the release and activation of bound β -amylase prepared from quiescent barley seeds (*Hordeum vulgare* L. cv. Clipper). Treatment with 2-ME (1 mM) resulted in an increase in the activity of the enzyme in the soluble fraction, but there was no change in the number of isoforms identified by isoelectric focusing and activity staining using a starch overlay procedure. Treatment with two cysteine-endopeptidases prepared from germinating barley (in the presence of 1 mM 2-ME) resulted in a similar increase in activity and the generation of a range of isoforms with increased pI values. These were similar to those found in germinated barley. Two isoforms found in germinated barley were not present in the endopeptidase-treated samples, however. The activity of free β -amylase, extracted from quiescent barley seed, was also increased by treatment with 2-ME and the endopeptidases. AS

2190

Best (S) and Muller (R). **Use of the hagberg falling number apparatus to determine malt and barley**

quality. *Journal of the Institute of Brewing* 97(4): 1991; 273-278

The Hagberg Falling Number measurement, widely used in the milling industry for assessing the baking quality of wheat flour, has been modified and used as a rapid mashing technique to assess malt quality. Barley Malt flour is mixed with cold mashing liquor containing 0.1% CaCl_2 and 15 mM β -mercapto-ethanol. The slurry is heated and mixed by the Falling Number apparatus, and the starch is gelatinized. After one min of heating/mixing the stirring rods are raised and released. As the gelatinized starch is hydrolysed by amylases, the viscosity of the slurry decreases allowing the stirring rods to fall. The time taken for these rods to fall a fixed distance is called the Falling Number. A relationship has been determined between the Falling Number obtained for a malt and the quality of the malt. Poor quality malts had a high Falling Number (e.g. > 200s) whilst good malts had a low Falling Number (e.g. < 150s). The correlation coeff. between Falling Number and Hot Water Extract (IOB coarse grind) was -0.89, and between Falling Number and Friability was -0.96. These good correlations indicate the measurement was influenced by the degree of endosperm modification. Being a mashing technique, however, the Falling Number was also influenced by other factors which influence mashing such as enzyme complement and water binding. This technique has the potential to measure malt quality using a commercial apparatus more rapidly than present malt analyses. No significant relationship could be determined between the Falling Number and the malting quality of barley. AS

2191

Holmes (MG). **The use of partially-modified barley for malting quality assessment.** *Journal of the Institute of Brewing* 97(4): 1991; 283-289

A series of tests based on the changes in the characteristics of barley caused by partial malting were investigated for selection of progeny with high malting potential from a breeding programme. The characteristics of these partially-modified barleys were investigated using Near Infra Red Reflectance Spectrophotometry (NIR), Pearling Resistance (PR), changes in Viscosity of Acidic Extracts, and changes in wt. and translucency of the cut surface of boiled grains. NIR carried out on "dry malts" was found to be accurate, whereas other methods were insufficiently accurate for selection. AS

Oats

2192

Duve (KJ) and White (PJ). **Extraction and identification of antioxidants in oats.** *Journal of the American Oil Chemists Society* 68(6): 1991; 365-370

Eight separate solvent systems were used with groats and hulls of several lines of oats to determine which system resulted in the most effective, rapid extraction of antioxidants. Antioxidant activity at room temp. was estimated by using thin-layer chromatography (TLC) along with a β -carotene spray. The greatest antioxidant activities were obtained with methanolic antioxidant extracts derived from Noble and Ogle oats and hulls. These extracts were added to soybean oil (SBO) and their effectiveness was compared with that of BHT, TBHQ and a control (no additives) at 32, 60 and 180 C. A petroleum ether extract of Noble oats also was tested in SBO at 180 C. Peroxide values (PV) for oils with added antioxidants during storage at 32 C and 60 C showed that the Ogle oat extract was more effective than the other oat and hull extracts or the control. There were no significant differences in effectiveness among the extracts and the control at 60 C. At 180 C, the stability of each oil was determined by measuring conjugated dienoic acid values (CD) and the relative amounts of the unoxidized fatty acid methyl esters (FAME) 18:2, 18:3 and 18:2/16:0. All oils with added oat and hull extracts had significantly lower CD and significantly higher 18:2/16:0 than oils with added BHT, TBHQ or the control during 14 days at frying temp. Phenolic and hydroxy-phenolic antioxidants compounds with acids, alcohols, sugars or glycerides attached were tentatively identified in the oat and hull extracts by using TLC and chromatographic sprays. AS

2193

Larsson (M) and Sandberg (A-S). **Phytate reduction in oats during malting.** *Journal of Food Science* 57(4): 1992; 994-997

The possibility of activating oat phytase by malting and a comparison of the optimal temp. and pH for phytase activity in oat, wheat, rye and barley was made. Addition of sprouted rye and barley as a potential source of phytase in oats was also investigated. Phytate reduction in oats, wheat, rye and barley during malting at 15 C for 30 - 40 h was 16, 2, 2 and 50% respectively. Optimum incubation temp. for phytate reduction in oats was between 37 - 40 C which differed from that in wheat (55 C). Malting of oats for 5 days at 11 C and subsequent incubation for 17 h at 37 - 40 C reduced phytate by 98%. Addition of sprouted rye or barley to oats before soaking reduced phytate to low levels. To obtain flour with a high mineral content, cereals could be soaked at optimal conditions and then malted. GS

Rice

2194

Lee (JH) and Singh (RP). **Influence of parboiling and freezing conditions on textural properties of California cooked rice.** *Journal of Food Quality* 14(5): 1991: 407-423

Thawed samples of cooked parboiled long (Cal Belle) and short (S 201) grain rice evaluated by Instron (Model 1122) showed significant increase of hardness but decrease in stickiness. The long grain rice was harder and less sticky than short grain rice. Hardness was negatively correlated with stickiness ($r = -0.82$). SD

Rice bran

2195

Ramsay (ME), Hsu (JT), Novak (RA) and Reightler (WJ). **Processing rice bran by supercritical fluid extraction.** *Food Technology* 45(11): 1991: 98, 100, 102, 104

This article compares the extraction of rice bran oil and the sterol composition of the extracted oil using conventional hexane and supercritical carbon dioxide with and without cosolvents. The results show that supercritical fluid process provides high quality and more natural rice bran products along with the high-valued sterol end products and it is more feasible for commercial applications. CSA

Rice starch

2196

Chrastil (J). **Influence of storage on supercooling of rice starch and flour gels.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1729-1731

Supercooling (SC) of amylose-amylopectin mixtures and starch or flour gels from fresh and stored rice has been studied. The results showed that the extent of SC of the amylose-amylopectin gels was indirectly related to the amylose content. Amylose sol. or gels did not supercool and, in the mixtures with amylopectin, inhibited SC. The SC of starch gels was influenced by oryzenin (rice storage protein). The supercooling of starch or flour gels from different var. of postharvest and stored rice was related to the mol. wt. of oryzenin and starch, oryzenin-starch interactions, and water binding, which reflected the structural changes of oryzenin and starch during rice storage. AS

Wheat

2197

Hamer (RJ), Weegels (PL) and Marseille (JP). **Prediction of the breadmaking quality of wheat: The use of HMW glutenin- a subunit-based quality scoring systems.** *Journal of Cereal Science* 15(1): 1992: 91-102

In this paper the possibilities of predicting the breadmaking quality of wheat are evaluated. This evaluation is based on the statistical analysis of two collections of Dutch-grown wheat samples. One collection, consisting of 164 wheat samples grown in 1984 is used to develop so-called prediction models. This includes models based only on HMW glutenin-A subunit compositions and an expanded model also including other parameters correlating with breadmaking quality. A second collection, consisting of 84 wheat samples grown in 1985, is used to validate the '1984' models. The HMW glutenin-A subunit-based models correlate positively but poorly (r^2 : 0.30-0.36) with loaf vol. Extending the model with other quality related parameters (particularly SDS-sedimentation vol.) leads to an improved model ($r^2 = 0.73$). The validation using the second sample set shows however that the predictive value of the HMW glutenin-A subunit based model is negligible ($r^2 = 0.005$) whereas the extended model also fails to allow a reliable prediction ($r^2 = 0.32$). Clearly, breadmaking quality is governed by the quality of the HMW glutenin-A subunits, and other factors, one of which is correlated with the amount of glutenin proteins. This leads to the general conclusion that electrophoretic scoring systems can only be of very limited use for the prediction of breadmaking quality. AS

Wheat starch

2198

Gibson (TS), Al Qalla (H) and McCleary (BV). **An improved enzymic method for the measurement of starch damage in wheat flour.** *Journal of Cereal Science* 15(1): 1992: 15-27

An improved enzymic method for the detn. of starch damage in wheat flour has been developed and characterized. The proposed method is simple and reliable, and enables up to 20 samples to be measured in duplicate in 2 h. A single assay takes approx. 40 min. The assay protocol is in two phases. In the first, the flour sample is incubated with purified fungal α -amylase to liberate damaged starch granules as soluble oligosaccharides. After centrifugation, the oligosaccharides in the supernatant are hydrolysed by amyloglucosidase to glucose in phase 2. The glucose is then quantified with a glucose oxidase/peroxidase reagent. The proposed method therefore avoids potential errors

associated with existing standard assays, which employ unpurified amylase preparations and non-specific reducing group methods to quantify the hydrolytic products. Despite the use of purified assay components, the proposed starch damage method did not exhibit an absolute end-point to the action of α -amylase in phase 1. This was due to a low rate of hydrolysis of undamaged granules, and is a feature of enzymic methods for starch damage detn. Other amylolytic enzymes, including β -amylase, isoamylase and pullulanase, and combinations of these enzymes, were evaluated as alternatives to α -amylase in the proposed method. These enzymes, when used alone gave no benefits over the use of α -amylase. When used in combination with α -amylase, there was a synergistic action on undamaged granules. A test kit based on the assay format described in this paper is the subject of an international interlaboratory evaluation. AS

MILLETS

2199

Almeida (NG), Calderon de la Barca (AM) and Valencia (ME). **Effect of different heat treatments on the antinutritional activity of *Phaseolus vulgaris* (variety Ojo de Cabra) lectin.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1627-1630

Ojo de Cabra bean lectin was partially characterized, and the nutritive value of raw and heat-processed beans were investigated in relation to this compound. The lectin purified by affinity chromatography on immobilized fetuin presented two bands of about 30 kDa in SDS-PAGE. It had an unusual high hemagglutinating capacity, and it was inhibited by fetuin and galactose. The lectin activity decreased 84% by dry heating and 99.8% by cooking. Although biological values of cooked beans were similar to those of other beans, toasting affected the PER and wt. of rats, but not the NPR. Raw beans were highly toxic; 33% of animals died at 10 days. The NPR value was negative, and this group lost more wt. than the N-free diet group. The histological examination revealed that the dietary lectin was bound to the mucosal surface coat of the duodenum and jejunum. AS

Corn

2200

Falabella (MC), Suarez (C) and Viollaz (PE). **Drying kinetics of corn in contact with a solid adsorbent.** *Journal of Food Engineering* 13(4): 1991: 273-283

This paper reports corn drying exp. using commercially available sodium bentonite clay. The sorption isotherm for the type of clay used in this work is also reported. Drying tests conducted with corn-to-clay mass ratios of 1:10 and 1:5 showed no effect on the drying rate. Similar results were obtained from drying exper. conducted with and without mechanical agitation of the mixtures. The effect of the clay temp. (18, 40 and 50 C) on corn drying was also investigated. Drying curves of corn subjected to air flows at 40 and 50 C were compared with those obtained with bentonite at the same temp. The drying kinetics in both cases were practically similar. AS

2201

Montville (TJ) and Shih (P-L). **Inhibition of mycotoxigenic fungi in corn by ammonium and sodium bicarbonate.** *Journal of Food Protection* 54(4): 1991: 295-297

This study sought to determine if NH_4HCO_3 and NaHCO_3 inhibit the naturally-occurring fungi in corn. Addition of 1 and 2% NH_4HCO_3 into cracked corn caused 5.9 - and 5.1-log CFU/g reductions, respectively, of corn's natural mycoflora. The same level of NaHCO_3 produced 1.2- and 2.0-log CFU/g reductions. In addition, NH_4HCO_3 fully inhibited monocultures of *Aspergillus ochraceus*, *Fusarium graminearum*, and *Penicillium griseofulvum* inoculated into autoclaved corn. NaHCO_3 was not as inhibitory but reduced the production of ochratoxin A 100-fold. AS

2202

Huang (CJ) and Zayas (JF). **Aroma quality of corn germ protein flours determined by sensory and gas chromatographic profiles.** *Journal of Food Quality* 14(5): 1991: 377-390

Acid washed, heat-treated and alcohol-washed corn germ protein flour (CGPF) were evaluated for aroma profiles by descriptive analysis procedure. Canonical discriminant analysis showed 4 clusters based on 8 descriptive attributes. Stepwise multiple regression between sensory and instrumental data (19 GC peaks eliciting important olfactory response) is established to predict aroma quality of CGPF. SD

2203

Bauer (A), Steger (U) and Wallnofer (PR). **Content of thiamin in green corn processed in the kitchen.** *Deutsche Lebensmittel-Rundschau* 87(6): 1991: 180-182 (De)

No significant change in fresh or cooked green corn soup and stored green corn soup was observed, but thiamin loss was observed in green corn soup kept warm for a longer time. BV

Sorghum

Sorghum starch

2204

Carcea (M), Cubadda (R) and Acquistucci (R). **Physicochemical and rheological characterization of sorghum starch.** *Journal of Food Science* 57(4): 1992: 1024-1025, 1028

The nature and functional behaviour of purified starches from 3 cvs of white sorghum [(i) Drawf White Milo, (ii) Dabar and (iii) Sorghum 100] were compared with commercial wheat starch. Wheat starch showed higher total lipid content (1.66%) than the 3 sorghum starches in which the lipids ranges from 0.75% for Dabar to 1.45% for Milo. The amylose content of sorghum starches was in the range of 22.0 - 27.8%. The water binding capacity of sorghum Dabar did not differ from that of wheat (110%). At 65 and 70 C (iii) starch showed higher swelling power values than (i) and (ii). Sorghum starches exhibited higher gelatinization temp. (about 65 C) than wheat starch (about 50 C). Sorghum starches showed single-step viscoamylographic curves with pronounced pasting peaks, good pasting stability and good set-back on cooling. GS

PULSES

2205

McCurdy (SM). **Infrared processing of dry peas, canola, and canola screenings.** *Journal of Food Science* 57(4): 1992: 941-944

The effect of infrared processing on the bitter flavour and protein solubility of dry peas (cv. Victoria); dehulling characteristics, myrosinase inactivation and oil quality of canola (cv. Wester) seed and seed viability and myrosinase activity of canola fine screenings was studied. Dehulling and air classification characteristics of processed dry peas was similar to raw peas. The protein content of concentrates from pea infrared heated to 107 C and 117 C was higher than that from raw peas or those heated to 126 C. Infrared heating to 107 C decreased protein solubility of raw peas. Peas processed at 126 C were more strongly flavoured than those processed at lower temp. The protein content of the dehulled canola (raw or processed) were between 21 and 22% (DM basis). The moisture contents of the raw and infrared processed canola were low. Heat processing seed partially inactivated myrosinase, but even the highest processing temp. could not inactivate the enzyme totally. Infrared

processing resulted in oils with higher P contents than in the oil from the raw seed. Heating to 105 C inactivated a high proportion of the myrosinase in canola fine screenings because of their higher moisture content (9.9 vs 5.3%) than the seed. GS

Peas

2206

Chan (ASM), Pereira (RR), Henderson (HM) and Blank (G). **A non-dairy frozen dessert utilizing pea protein isolate and hydrogenated canola oil.** *Food Technology* 46(1): 1992: 88-92

The formulation and preparation of an all-vegetable frozen dessert utilizing pea protein isolate and hydrogenated canola oil with acceptable sensory qualities to meet the special dietary needs is described. CSA

2207

Das (N), Saini (SPS) and Bains (GS). **Drying behaviour of green peas.** *Indian Food Packer* 46(2): 1992: 27-33

Green pea (*Pisum sativum*) var. (Pb-87, Pb-88 and Hb-8) were harvested after 110 days (Pb-87 and Pb-88), 90 days (Hb-8) (maturity I) and 15 days thereafter (maturity II) and the drying characteristics were studied. Peas from first picking dried faster and gave higher drying ratios. Hb-8 showed lower drying ratio than Pb-87 and Pb-88 when harvested at maturity I. All the cv. behaved alike in their dehydration characteristics. Tender peas were most suitable for dehydration. Moisture, soluble sugars and ascorbic acid of pea declined with maturity. AIS, fibre, starch, protein, chlorophyll and phytic P increased with maturity. KAR

Snap beans

2208

Trail (MA), Wahem (IA) and Bizri (JN). **Snap bean quality changed minimally when stored in low density polyolefin film package.** *Journal of Food Science* 57(4): 1992: 977-979

Snap beans packed in low density polyolefin film and stored at 5 C and 10 C were removed at days 0, 4, 8, 12, and 16 for quality evaluation. Chlorophyll content of beans stored at 5 C was not influenced by storage period. Pods stored at 10 C showed significant increase in chlorophyll after 4 days storage followed by a decline as time of storage increased. Hue angle and tristimulus a corresponded more closely to chlorophyll content and were better indicators of snap bean colour than

chroma and tristimulus L^* and b^* . Wt. loss, seed percentage and ascorbic acid were higher in pods stored at 10 C than in those stored at 5 C. Storage temp. and period had no influence on texture or soluble solids content. AS

OILSEEDS AND NUTS

Groundnuts

2209

Chlou (RY-Y), Tseng (C-Y) and Ho (S). **Characteristics of peanut kernels roasted under various atmospheric environments.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1852-1856

Peanut kernels (Tainan 9, a Spanish cv) were roasted in a stainless steel vessel (600 mL) at 210 C under a continuous flow of air, N_2 , CO_2 and O_2 at 1.3L/min (LPM) and without aeration as a control, for 0, 10, 18, and 25 min. Hunter L values of the deskinners kernels decreased while a and b values increased with roasting time. The most and the least significant changes in colour of peanuts occurred under O_2 and CO_2 atm., respectively. The best flavour was obtained by roasting peanuts under N_2 or CO_2 for 18 min. Decreases of total α -amino N, glucose, sucrose and conarachin contents and specific lipooxygenase activity were dependent on the extent of heat treatment (roasting time) rather than on atm. gas composition. Peanuts roasted under O_2 for 25 min were more stable during initial stages of an oven test at 62 C compared to peanuts roasted under other types of atmospheric gas. AS

2210

Chlou (RY-Y), Ferng (S) and Liu (Y-F). **Comparison of sound and shriveled peanut kernels from sized commercial lots.** *Journal of Food Science* 57(4): 1992: 998-1001

Sound and shriveled peanut kernels obtained from sized commercial lots were subjected to compositional analyses, and roasted at 150 C for 25 min before subjecting to analysis of sugars, total and free amino acids, protein patterns and oven test. Shriveled raw peanuts contained higher moisture, free amino acid, sucrose, and glucose, and lower lipid contents than sound peanuts. Shriveled kernels underwent greater decreases in total and free amino acids, less increase in sucrose, and more protein denaturation after roasting. Shriveled kernels were more susceptible to oxidative deterioration. AS

2211

Manoharan (V) and Ramalingam (RS). **Oil content and its association with seed size and yield in Virginia groundnuts.** *Madras Agricultural Journal* 77(9-12): 1990: 562-564

Fifty Virginia Bunch and Virginia Runner groundnut (*Arachis hypogaea* L. subsp. *hypogaea*) were selected at random and the kernel yield and kernel wt. were recorded. Oil content was estimated by NMR spectrometer. Oil content showed a very low genotypic coeff. of variation (2.49%). Broad sense heritability was high for seed size and oil content. Oil content was positively correlated with seed size and seed yield. Hence simultaneous improvement in oil content could be achieved through indirect selection for seed size and yield. GS

Soybeans

Soy products

2212

Shambuyi (M), Beuchat (LR), Hung (Y-C) and Nakayama (T). **Evaluation of substrates and storage conditions for preparing and maintaining starter cultures for tempeh fermentation.** *International Journal of Food Microbiology* 15(1/2): 1992: 77-85

Heat-pasteurized cassava root, cowpeas, partially defatted peanuts, rice and soybeans were evaluated for their suitability to support growth and sporulation of the *tempeh* mold. *Rhizopus microsporus* var. *oligosporus*, and the *oncom* mold, *Neurospora Intermedia*, at 25, 30 and 37 C. The molds grew best and sporulated most luxuriantly on cassava and rice incubated at 37 C. Viability of molds remained high for up to 30 wks when dried (a_w 0.48), powdered substrates on which the molds had been cultured, were stored at 5, 25 and 37 C. Survival was best when powders were stored at 5 C, although storage at 25 C did not cause a marked decline in CFU/g. *R. microsporus* var. *oligosporus* starter cultures produced on rice and then stored for 20 wks at these temp. compared most favourably with commercial starter cultures for preparing high-quality soybean *tempeh*. The simple technology required to prepare these starter cultures enhances the potential for their application in developing countries where the introduction of nontraditional fermented legume foods to low-protein diets could help to ameliorate malnutrition. AS

2213

Gennandios (A) and Weller (CL). **Edible films and coatings from soy milk and soy protein.** *Cereal Foods World* 36(12): 1991: 1004-1009

Protein-based edible films have many applications in food products. The manufacture, characteristics, and application of such films from soybeans are discussed in this review article. 57 references. BV

Tofu

2214

Roussel (AM), Ravel (A), Faure (P), Alary (J) and Favier (A). **Tofu consumption: Effects on plasma lipids in rats.** *Journal of Food Science* 57(4); 1992: 903-905, 912

Rats (Wistar) fed on the tofu (soybean curd) diet showed very low cholesterol levels and an acceptable high density lipoprotein (HDL) cholesterol/total cholesterol ratio. Growth and amino acid profile were also adequate, but the bioavailability of trace elements decreased. BV

Soy proteins

2215

Yu (M-A) and Srinivasan Damodaran. **Kinetics of destabilization of soy protein foams.** *Journal of Agricultural and Food Chemistry* 39(9); 1991: 1563-1567

The kinetics of destabilization of soy protein foams was studied by monitoring the decay of interfacial area of foams as a function of time. The decay of soy protein isolate (SPI), soy 11S, and soy 7S foams followed biphasic first-order kinetics. These two kinetic phases were related to gravitational liquid drainage and interbubble gas diffusion processes. The relative magnitude of the contribution of these two microscopic processes to foam decay was dependent on environmental factors such as pH, temp., ionic strength, and protein concn. SPI and soy 11S foams were more stable than soy 7S foams. The poor stability of soy 7S foam was mainly due to its inability to retard gravitational drainage. AS

2216

Klavons (JA), Bennett (RD) and Vannier (SH). **Stable clouding agent from isolated soy protein.** *Journal of Food Science* 57(4); 1992: 945-947

A process to prevent particle aggregation and provide a model system analogues to cloud particle formation and retention in fresh and commercially processed citrus juices is presented. Results indicated that the use of isolated soy protein (PP 710) instead of a crude soy protein eliminated undesirable off-flavour. The stability of the beverage is affected adversely, when soy protein is increased in the medium by a factor of 10, maintaining the soluble pectin concn. The use of soy protein based

clouding agent in beverages has many advantages. It eliminates the need of brominated vegetable oils and other lipid-based materials. GS

TUBERS AND VEGETABLES

Beet roots

2217

Drdak (M), Altamirano (RC), Rajniakova (A), Simko (P), Karovicova (J), Benkowska (D). **Red beet pigment composition. Effects of fermentation by different strains of *Saccharomyces cerevisiae*.** *Journal of Food Science* 57(4); 1992: 935-936

Pasteurized red beet juice was inoculated with seven strains of *Saccharomyces cerevisiae* after adjusting pH to 5.8. Fermentation was at 26 C. The decay of red beet pigments was spectrophotometrically determined and expressed as betanine. Average percentages of betanine, isobetanine, betanidine, isobetanidine and the saccharide components were monitored by HPLC. After 40 h fermentation, the strains Oenoferm, 1090 and Tokaj 76D showed pigment retentions and sucrose concn. (g.L⁻¹) of 62% and traces, 58% and 3.4, and 56% and 1.4 respectively, and were considered the most suitable. AS

Carrots

2218

Oliveira (FAR) and Silva (CLM). **Freezing influences diffusion of reducing sugars in carrot cortex.** *Journal of Food Science* 57(4); 1992: 932-934

The loss of reducing sugars from raw and previously frozen carrot cortex tissue immersed in warm water was studied as a function of temp. (40 - 100 C). Leaching was described as a diffusional mechanism by application of Fick's 2nd law. This approach successfully modeled losses from raw carrots at temp. higher than 60 C. At low temp. diffusion was much slower, due to a high resistance of the tissues to mass transfer, and Fick's 2nd law could not be applied. Previously frozen carrots showed a Fickian behaviour through the range of temp. and diffusivities were much higher. Dependence of diffusivity on temp. followed an Arrhenius type equation for the 2 cases. However, the activation energy of pre-frozen carrots was lower, indicating loss of sensitivity to temp. variations. AS

Turnips

2219

Moreira (LA), Oliveira (FAR) and Silva (TR). **Prediction of pH change in processed acidified turnips.** *Journal of Food Science* 57(4): 1992: 928-931

The acetic acid uptake by turnips was studied during an acidification process in containers. The process was successfully described by a Fickian diffusion, using a correlation for the buffer effect. Diffusion coeff. (0.629 to $3.99 \times 10^{-9} \text{ m}^2/\text{sec}$) and partition coeff. (0.8 to 1.1) were obtained by optimization of the fit between experimental and theoretical values, using the simplex method. The partition coeff. did not show an evident dependence on temp., while diffusivity followed an Arrhenius type behaviour. The relationship between acid concn. and pH was described using a cubic model with parameters independent of temp. Results showed that the combination of these models describing the acid diffusion into the food and the buffering effects of the food allowed accurate prediction of pH evolution in the acidification process. AS

Potatoes

2220

Shivankar (VJ) and Kavadia (VS). **Effect of post-harvest processes in heptachlor residues in potato, sweet potato and onion.** *Tropical Agriculture* 69(1): 1992: 25-28

Heptachlor and heptachlor residues as influenced by the washing, boiling/cooking and dehydration were determined in the mature tubers/bulbs of sweet potato, potato and onion grown on clay-loam soil treated with 2.5 , 5.0 and $10.0 \text{ kg a.i./ha}^{-1}$ 35 days before harvest were used. Washing removed 22-29% insecticide from all crops. Washing plus peeling and cooking removed 85-93% and 94-100% of heptachlor residues in sweet potato and potato respectively. Dehydration reduced the residues by 74-100%, 80-100% and 84-100% in sweet potato, potato and onion respectively. Max. 0.03 p.p.m. of heptachlor was detected in sweet potato, and potato after cooking whereas in onion there was no residue. SD

Vegetables

2221

Van Buren (JP) and Pitifer (LA). **Retarding vegetable softening by cold alkaline pectin deesterification before cooking.** *Journal of Food Science* 57(4): 1992: 1022-1023

Snap beans and carrot tissues, deesterified at 1 C and pH 12.5 , soften much more slowly than control tissues when cooked at neutral or slightly alkaline pH. High pH or NaCl during cooking had little effect on the degree of softening. Soaking in 0.05 M EDTA led to an 86% loss in firmness. The results were consistent with a reduction in the β -elimination depolymerization of pectin during heating as a result of deesterification in the alkali. Deesterified tissues remained susceptible to pronounced softening during cooking at pH 3.5 . Potatoes, cauliflower and apples showed similar effects. Peas gave a reduced response. Beets and dry beans did not show a retardation of softening after an alkali soak. AS

Cabbages

2222

Kallander (KD), Hitchins (AD), Lancette (GA), Schmiege (JA), Garcia (GR), Solomon (HM), Sofos (JN). **Fate of *Listeria monocytogenes* in shredded cabbage stored at 5 and 25 C under a modified atmosphere.** *Journal of Food Protection* 54(4): 1991: 302-304

Shredded cabbage was inoculated with *Listeria monocytogenes* Scott A cells and stored in normal air or a modified ($70\% \text{ CO}_2$ and $30\% \text{ N}_2$) atm. at 5 and 25 C . Under the normal atm. at 25 C , colony counts increased by 2 logs within 2 days of storage but then decreased to undetectable levels within 6 days of storage. In the modified atm. at 25 C , numbers also decreased to undetectable levels within 6 days, but with a less marked initial increase and a decline that was more rapid than in the unmodified atm. In the cold (5 C), the counts increased gradually, but only by about 1 log, in both atm. In normal atm. at 5 C , however, colony counts decreased sharply after 13 days of storage. Reductions in colony counts coincided with decreases in cabbage pH and development of spoilage. The increased level of CO_2 was ineffective in controlling *L. monocytogenes* at 5 C . At 25 C cabbage spoilage was rapid and colony counts declined under both atm. of storage. AS

Cauliflower

2223

Barth (MM), Perry (AK), Schmidt (SJ) and Klein (BP). **Misting affects market quality and enzyme activity of broccoli during retail storage.** *Journal of Food Science* 57(4): 1992: 954-957

Vitamin C, enzyme activities, colour and texture changed in misted and nonmisted broccoli (cv. Green Duke) at 0 , 24 , 48 and 72 h intervals during display cabinet storage (18 C). Misting significantly

Improved reduced ascorbic acid ((RAA) $P = 0.0001$), chlorophyll ($P = 0.0001$), and green colour retention, as measured by hue angle ($P = 0.00021$) during 72 h storage. RAA degradation in misted and nonmisted broccoli and total chlorophyll degradation in nonmisted samples followed first order kinetics. Mean % moisture content was significantly greater (P less than or equal to 0.05) in misted broccoli samples at 24, 48 and 72 h storage intervals. No significant difference was found in ascorbic oxidase activity ($P = 0.9426$) between misted and nonmisted samples. Peroxidase activity was significantly greater in both the nonmisted broccoli floret/stem ($P = 0.0221$) and stalk tissue ($P = 0.0079$). BV

Cucumbers

2224

McFeeters (RF). **Cell wall monosaccharide changes during softening of brined cucumber mesocarp tissue.** *Journal of Food Science* 57(4); 1992: 937-940, 953

Cucumber (cv. Calypso) mesocarp tissues were subjected to 3 processing treatments i.e (i) blanched (ii) unheated and (iii) fermented with *Lactobacillus plantarum* and stored at pH 3.5. Results indicated that tissue softening and solubilization of cell wall sugars were similar in the 3 treatments. A limited degradation of pectic and hemicellulosic substances occurred during cucumber tissue softening. Losses in galacturonic acid, galactose, arabinose and rhamnose from cell walls occurred at pH 3.5 when cucumber tissues were subjected to sequential extraction with aqueous sodium dodecyl sulphate and phenol:acetic:water (2:1:1). GS

2225

Omran (H), Buckenhuskes (H), Jackle (E) and Gieschner (K). **Some properties of the pectase, the exo-polygalacturonase and an endo- β -1, 4-glucanase in pickled cucumbers.** *Deutsche Lebensmittel-Rundschau* 87(5); 1991: 151-156 (De)

Tomatoes

2226

Trifiro (A), Gherardi (S) and Castaldo (AD). **Use of rheological parameters for pressure drop calculation of tomato concentrates in tubes.** *Italian Journal of Food Science* 3(1); 1991: 63-68

The use of power law parameters k and n for the calculation of pressure losses in the transport of tomato concentrates (TC) through tube bundles was evaluated. TC at different concn. (10.2 - 15.2 - 23.2 - 27.6°Brix) and different temp. (30 and 80 C) were

pumped through tubes of different diam. (2.49 - 3.88 - 4.85 - 6.64 - 8.40 cm) and the corresponding pressure losses were measured. The pressure losses at the different operating conditions were also calculated from the rheological parameters obtained with a concentric cylinder viscometer. For the products at 15.2, 23.2 and 27.6°Brix, good agreement was obtained between the calculated and the experimental data. AS

2227

Bhowmik (SR) and Pan (JC). **Shelf-life of mature green tomatoes stored in controlled atmosphere and high humidity.** *Journal of Food Science* 57(4); 1992: 948-953

Freshly harvested mature green tomatoes were washed, sorted and treated with 125 p.p.m. chlorine water. The treated tomatoes were stored at 85% or 98% RH under controlled atm. (CA) storage for periods up to 8 wk. The CA was 2.5% O₂, 5.0% CO₂, and N₂ as the balance gas at 12 C. After storing for 40 days, the tomatoes were allowed to ripen in air at 23 C. Samples of tomatoes were tested every 3 days to examine changes in quality as determined by visual observation, wt. loss, titratable acidity, pH, colour and firmness. Wt. loss was reduced significantly by CA storage of tomatoes at 98% RH. Tomatoes remained green up to 40 days of storage and changed in colour gradually during consecutive storage in atmospheric conditions. Appearance of the tomatoes was acceptable after ripening. AS

2228

Rodriguez (JH), Cousin (MA) and Nelson (PE). **Oxygen requirements of *Bacillus licheniformis* and *Bacillus subtilis* in tomato juice: Ability to grow in aseptic packages.** *Journal of Food Science* 57(4); 1992: 973-976

Tomato juice was inoculated with spores of *Bacillus subtilis* and *B. licheniformis*, placed in jars sealed with 4 polymers: oriented polypropylene (OPP), low density polypropylene with 4.5% ethyl vinyl acetate (LDPE + EVA), polyvinylidene chloride (PVDC), and polyethylene terephthalate (PET); used in aseptic packages, serving as lids, heated in a boiling water bath for 10 min, and incubated at 35 C for up to 100 days. *B. subtilis* and *B. licheniformis* grew at the surface of the food when OPP and LDPE + EVA were used, which caused the pH to rise above 4.6 in 60 days and above 5.0 within 100 days. The oxygen partial pressures were 0.20 and 0.18 atm/day, and the oxygen permeation ratios were 5.64 and 0.76 cc/day for LDPE + EVA and OPP, respectively. AS

FRUITS

2229

Chadha (RK), Bryce (F), Lawrence (JF), Conacher (HBS) and Arnold (D). **Toxicity of potassium cyanide added to fresh fruit and juice.** *Food and Chemical Toxicology* 29(10): 1991: 681-684

To investigate the toxicity of potassium cyanide in fresh fruit and juice, male and female Wistar rats were orally dosed with fruit homogenates or juices containing 3 x LD₅₀ of potassium cyanide. These were given in single doses at various intervals after spiking. The dosing sol. were analysed for cyanide using a cyanide test kit. There was a good correlation between the toxic signs in rats and the cyanide remaining in dosing sol. The toxicity of spiked apple and honeydew melon diminished with time, while spiked grape and both grape and apple juices maintained their toxicity during the 4-h studies. The pH of the samples both before and after spiking seemed to be an important factor in determining the toxicity. AS

Apples

2230

Mattheis (JP), Buchanan (DA) and Fellman (JK). **Change in apple fruit volatiles after storage in atmosphere inducing anaerobic metabolism.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1602-1605

Delicious apple fruit (*Malus domestica* Borkh.) stored in 0.05% O₂/0.2% CO₂, 1°C, for 30 days developed large concn. of ethanol and acetaldehyde. The accumulation of products of anaerobic metabolism resulted in altered synthesis of fruit volatiles, most notably a large increase in the amount of ethyl acetate. Several ethyl esters, not detectable from control fruit, were present in headspace samples collected from apples stored in 0.05% O₂/0.2% CO₂ including ethyl propanoate, ethyl butyrate, ethyl 2-methylbutyrate, ethyl hexanoate, ethyl heptanoate, and ethyl octanoate. The increase in the emission of these compounds was accompanied by a decrease in the amounts of other esters requiring the same carboxylic acid group for synthesis. AS

2231

Tong (CBS) and Hicks (KB). **Sulfated polysaccharides inhibit browning of apple juice and diced apples.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1719-1722

Browning of fresh Granny Smith apple juice was inhibited almost 100% for 24 h at room temp. by the addition of l-, k-, or λ-carrageenan, alone (0.25%) or in combination (0.05%) with 0.5% citric acid (CA). The combinations of 0.1% of any of the carrageenans and 0.5% sodium hexametaphosphate (SHMP) was slightly less effective. Browning was also inhibited by amylose sulphate (0.025%) or xylan sulphate (0.025%) combined with 0.5% CA. Under the assay conditions, CA alone inhibited browning approx. 34%, but SHMP alone did not inhibit browning. The inhibition of browning by these compounds in combination with the carbohydrate polymers was synergistic. The combination of 0.1% of any of the carrageenans and 0.5% CA was able to inhibit browning of unpasteurized apple juice containing 0.1% sodium benzoate for up to 3 months at 3°C. The combination of 0.5% carrageenan and 0.5% CA also inhibited browning in Granny Smith and Red Delicious diced apple fruit. These combinations may have practical application in the prevention of enzymatic browning in fresh, raw apple juice or diced apples. AS

2232

Amoit (MJ), Tacchini (M), Aubert (S) and Nicolas (J). **Phenolic composition and browning susceptibility of various apple cultivars at maturity.** *Journal of Food Science* 57(4): 1992: 958-962

Phenolic compounds and polyphenol oxidase (PPO) activity in the fruits of 11 apple cvs before and after bruising were studied in relation to their susceptibility to browning. The degree of browning has been determined by the simultaneous measurements of soluble (absorbance at 400 nm) and insoluble (lightness) brown pigments. The sum of these two expressing the extent of browning, closely correlated with the amount of phenolics (hydroxycinnamic derivatives and flavan-3-ols) degraded. Maturity did not appear to greatly influence the development of browning. AS

2233

Yahia (EM). **Production of some odour-active volatiles by 'McIntosh' apples following low-ethylene controlled-atmosphere storage.** *Hortscience* 26(9): 1991: 1183-1185

The effectiveness of some post-storage treatments in enhancing the flavour components of low-ethylene controlled-atm. (LCA) stored 'McIntosh' apples (*Malus domestica* Borkh.) was investigated. Fruits were stored for 9 months in LCA at 3.3°C and then exposed to air at 20°C and to air, simulated LCA, 100% O₂, or light at 3.3°C for up to 4 wks. Respiration and ethylene production indicated that apples were still in the early stage of ripening after

9 months of storage in LCA. GC analysis for 13 odour-active volatiles revealed the presence of 8. Air at 20 C after LCA significantly increased the production of some odour volatiles, while light for up to 3 wks only slightly increased their concn. Post-storage exposure to air or 100% O₂ at 3.3 C for up to 4 wks was not effective in enhancing volatile formation. AS

Dates

2234

Almana (HA) and Mahmoud (RM). **Effect of date syrup on starch gelatinization and quality of layer cakes.** *Cereal Foods World* 36(12): 1991; 1010-1012

Sucrose replaced with date syrup in yellow and chocolate-flavoured layer cakes at 0, 25, 50, 75 and 100% levels showed a deterioration in cake vol., cell structure, grain, texture, colour, and flavour which increased with increasing concn. of date syrup. Chocolate cakes containing 25% date syrup were similar to the sucrose control in all aspects except for being darker in colour. Date syrup delayed gelatinization to a lesser extent than did sucrose. Starch gelatinization temp. was inversely related to the extent of sucrose replacement by date syrup, with flour containing 100% date syrup having the lowest gelatinization temp. BV

Momordica charantia

2235

Yuwei (KE), Rao (KS), Kaluwin (C), Jones (GP) and Rivett (DE). **Chemical composition of Momordica charantia L. fruits.** *Journal of Agricultural and Food Chemistry* 39(10): 1991; 1762-1763.

The chemical composition of bitter gourds (BG) was analyzed. The BG yielded on extraction with chloroform-methanol 0.76% lipids (dry wt.), which were separated into nonpolar lipids (38.81%), glycolipids (35.80%), and phospholipids (16.40%) by silicic acid column chromatography. The mineral and amino acid analysis showed that the BG contained nutritionally useful quantities of most of the essential minerals and amino acids. The predominant fatty acid was α -eleostearic acid in nonpolar lipids, linolenic acid in glycolipids, and palmitic acid in phospholipids. AS

Oranges

2236

Charara (ZN), Williams (JW), Schmidt (RH) and Marshall (MR). **Orange flavour absorption into**

various polymeric packaging materials. *Journal of Food Science* 57(4): 1992; 963-966, 972

Citrus oil components (from cold-pressed and terpeneless oils), which contribute substantially to flavour of orange juice, were shown to be absorbed into various polymeric materials [LDPE, HDPE, polypropylene (PP), and surlyn (S)] used in aseptic packaging. Equilibration of absorption took place within 4 days, while extraction of the oil constituents occurred in 24 h when higher temp. were used. Substantial absorption of oil constituents by LDPE and S occurred while highly crystalline polymers (PP and HDPE) did not absorb much. The degree of absorption also depended on the nature of the oil constituents. Absorption was higher for terpene constituents followed by sesquiterpenes and aldehydes. Swelling factors showed that highly crystalline polymers (HDPE and PP) swelled less than crystalline polymeric materials. Citrus oil affected the crystallinity of the polymers by lowering their melting point and percent crystallinity. AS

Pawpaws

2237

Shiota (H). **Volatile components of pawpaw fruit (Asimina triloba Dunal.).** *Journal of Agricultural and Food Chemistry* 39(9): 1991; 1631-1635

Volatile components of pawpaw fruit were mainly ethyl esters (hexanoate, 50.2%; octanoate, 19.3%; butanoate, 8.5%; and decanoate, 1.3%) which were accompanied by methyl esters (butanoate, hexanoate, octanoate, geranate, decanoate and farnesate). Butane-2,3-diol monoesters (butanoate, hexanoate and octanoate) were also detected, and these esters except 3-acetoxybutan-2-one were reported to be present in nature for the first time. In addition, the effect of fruit maturity on volatile aroma composition was examined. AS

Pineapples

2238

Takeoka (GR), Buttery (RG), Teranishi (R), Flath (RA) and Guntert (M). **Identification of additional pineapple volatiles.** *Journal of Agricultural and Food Chemistry* 39(10): 1991; 1848-1851

The volatiles of pineapple essence were isolated by liquid-liquid extraction, fractionated on neutral alumina, and analyzed by high-resolution GC and coupled GC/MS. 26 constituents (1 tentative) were identified for the first time in pineapple including the following sulphur compounds: methyl 3-(methylthio)-(E)-2-propenoate, methyl

3-(methylthio)-(Z)-2-propenoate, ethyl
 3-(methylthio)-(E)-2-propenoate, ethyl
 3-(methylthio)-(Z)-2-propenoate, methyl
 4-(methylthio)butanoate, thyl
 4-(methylthio)butanoate (tentative), and dimethyl
 trisulphide. Their odor contribution to pineapple
 aroma is assessed. AS

CONFECTIONERY, STARCH AND SUGAR

2239

Paul (J). **Different aspects of microbial degradation of cellulose.** *Indian Journal of Microbiology* 32(2): 1992: 127-147

An exhaustive review covering aspects like mode of action of cellulose in different systems including fungal, bacterial, actinomycetes, termites, and in rumen. To improve the enzyme production various improvements done with the existing strains including the study of molecular aspects of degradation, sequence homology and conserved sequences, and modification of specific residues are reviewed. 117 references. KAR

Starch

2240

Timmermann (EO) and Chirife (J). **The physical state of water sorbed at high activities in starch in terms of the GAB sorption equation.** *Journal of Food Engineering* 13(3): 1991: 171-179

A refinement of the Guggenheim-Anderson-de Boer (GAB) sorption model which allows for the existence of a third sorption stage, was used to analyze the behaviour of adsorption isotherms of starches at very high a_w . The results of experimental isotherm analysis with the new model revealed that above about $a_w = 0.90$ a change in the physical state of adsorbed water in starch occurred, i.e. the water molecules would be more 'liquid-like' than in the preceding layers. This transition corresponds with the unfreezable water content in starch, as determined by others. AS

2241

Kim (CS) and Walker (CE). **Changes in starch pasting properties due to sugars and emulsifiers as determined by viscosity measurement.** *Journal of Food Science* 57(4): 1992: 1009-1013

The effects of sugars, emulsifiers, and their interactions on starch pasting properties were determined by the Rapid Visco-Analyser (RVA). Solutions of 50% sugars in water were used. The disaccharides, sucrose and lactose, delayed pasting

more than did the monosaccharide, dextrose. Sugars' effects on starch pasting delay and on starch paste consistency varied with the starch. Addition of the same emulsifier (1%) to different starches did not result in the same change in paste consistency in the presence of high amounts of sugar. Both sucrose ester F-160 (SE) and polysorbate 60 (PS) reduced the hot paste consistency of starch-sugar mixtures, with SE having a greater effect than PS. AS

Sugar

2242

Dendsay (JPS), Luthra (R), Sehtiya (HL) and Dhawan (AK). **Deterioration of juice quality during post-harvest storage in some sugarcane cultivars.** *Indian Sugar* 42(2): 1992: 93-95

Post-harvest deterioration in juice quality was studied during the month of April (mean temp. min. 16.7 and max. 33.6 C) at Haryana Agricultural University, Karnal (N. India). Sugarcane cv. (CoJ 64, Co 7717, CoS 767, Co 1158, Co 1148, CoH 56, CoH 77, CoH 35) grown in the field under recommended cultivation practices were detashed and detoped, bundles were made and stored in the open. Cv. samples were taken at 0, 24, 72 and 120 h, and analysed for Brix, Pol, purity and commercial cane sugar (CCS) %. The test cv., except CoS 767, did not show any drop in sugar recovery at 24 h of post-harvest storage. A sharp decrease in % CCS, Pol, purity and increase in Brix and reducing sugars in most of the cv. at 72 and 120 h after harvest was observed. CoS 767 var. was the most vulnerable as it showed > 50% losses of recoverable sucrose at 120 h of storage, and CoH var. showed the least deterioration. SRA

2243

Malavia (DD), Patel (KP) and Ramani (VB). **Response of irrigation levels and trash mulch on yield and quality of sugarcane.** *Indian Sugar* 44(2): 1992: 97-100

A field exp. was conducted using sugarcane cv. Co 6304 and CoC 671 for 2 yr (1987-88 and 89) on medium black soil at sugarcane Research Station, Gujarat Agricultural Univ. Junagadh to determine the optimum irrigation schedule and the efficiency of trash mulch. Cane yield increased with increasing irrigation frequencies under the IW/CPE ratio of 1:2. The var. Co 6304 out yielded CoC 671 in productivity. Irrigation levels did not show significant effect on quality of canes. Max. net realization of Rs. 9.74/ha was obtained under normal irrigation + trash mulching. SRA

2244

Kundu (S) and Gupta (ML). **Changes in physico-chemical properties of gur on storage in some promising varieties of sugarcane.** *Indian Sugar* 42(2): 1992: 115-118

The gur cubes from 18 var. of sugarcane were prepared, wrapped in colourless polyethylene bags and stored for 9 months from Feb. to Nov. 1990 at room temp. (min. of 20.6 C in Feb. and max. of 40.1 C in June with varied RH of 55 to 94%). Samples were analysed in Feb. and Nov. months for sucrose, reducing sugar, moisture, ash and colour transmittance. Results showed that good keeping quality of gur was found in the var. Co 86024, Co 89003 and Co 89034, in which gur samples had recorded reducing sugar < 6%, ash 2% and both characters were found associated with the higher amounts of sucrose (> 80%) and with low level of moisture content (< 5%) after storage. The max. quantity of gur (10.3%) was produced by the Co 89003 var. followed by Co 89032. The colour transmittance value declined drastically in all gur samples on storage. SRA

BAKERY PRODUCTS

Bread

2245

Oliver (JR) and Allen (HM). **The prediction of bread baking performance using the farinograph and extensograph.** *Journal of Cereal Science* 15(1): 1992: 79-89

Optimal loaf vol. was obtained when dough was mixed to the end of the plateau period of the Farinograph mixing curve. The identification of this point was easier if the Farinograph were run faster (180 rev/min) than the conventional speed (60 rev/min). Unlike mixing time, the work requirement to this point was independent of mixing speed. The Farinograph and Extensograph parameters measured on a flour-water system did not relate well to those made on even a simple bread formula system. To obtain a better prediction of baking behaviour for a commercial application, it is essential that a commercial formula and similar work input be used to mix the dough. AS

Cakes

2246

Sobczynska (D) and Sester (CS). **Replacement of shortening by maltodextrin-emulsifier combinations in chocolate layer cakes.** *Cereal Foods World* 36(12): 1991: 1017-1026

Cakes made with a potato maltodextrin and emulsifiers at 50 or 100% level were comparable to the control 100% shortening cakes. Cakes made with sucrose ester tended to have higher vol. than cakes made with other emulsifiers. Incorporation of prehydrated emulsifier and dry maltodextrin generally provided highest vol. BV

Cookies

2247

Bullock (LM), Handel (AP), Segall (S) and Wasserman (PA). **Replacement of simple sugars in cookie dough.** *Food Technology* 46(1): 1992: 82, 84, 86

This article presents the development of cookies containing no added sugars by replacing them with acesulfame K, a high-intensity non-nutritive sweetener along with polydextrose, powdered cellulose and soy fiber as bulking agents. Properties such as moisture content, break strength, total dietary fiber and reflectance were analyzed and the cookies evaluated had acceptable sensory and physicochemical properties. CSA.

2248

Gaines (CS). **Instrumental measurement of the hardness of cookies and crackers.** *Cereal Foods World* 36(12): 1991: 989, 991-994, 996

The availability of accurate and reproducible product texture measurements can be critical to successful product development. This article describes and discusses two such methods based on adaptation of a standard instrument. BV

MILK AND DAIRY PRODUCTS

2249

Rao (SVN), Kherde (RL) and Tyagi (KC). **Why delay in farmers' adoption of dairy technologies ?.** *Indian Dairyman* 44(6): 1992: 288-301

The personal characteristics of farmers which are positively related to adoption of dairy technologies are surveyed. Dairy farmers with more land and animals, high education status and social participation, more contact with extension and mass media and high knowledge of dairy innovations are found to be better adopters of dairy technologies. GS

Milk

2250

Anon. **Measurement and comparison of density, specific heat and viscosity of cow's milk and soymilk.** *Journal of Food Engineering* 13(3): 1991: 221-230

The proximate composition, density, specific heat and viscosity of various dilutions of cow's milk and soymilk produced from each of two local var. of soybeans (TGX 330-0102D and Doko) were determined at 25 C and subjected to regression analyses in order to determine the relationships between the percentage of total solids (%TS) and each of these primary physical properties. Density was found not to be significantly dependent on %TS or var. of soybeans whereas specific heat and viscosity were dependent. The relationship between specific heat and %TS was found to be linear and that between viscosity and %TS was found to be exponential for each of the three milk samples. Generally, at the same %TS, soymilk is denser and has greater specific heat and viscosity values than cow's milk. AS

2251

Fay (L), Richli (U) and Liardon (R). **Evidence for the absence of amino acid isomerization in microwave-heated milk and infant formulas.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1857-1859

In this study, UHT milk and three different infant formulas were heated under two sets of conditions: 600 W for 3 min and 70 W for 20 min. When the proportions of D-amino acids were measured after acid hydrolysis, no significant differences could be found between untreated and treated samples. On the basis of these results, it is concluded that heating of milk or infant formula in a microwave oven under conditions corresponding to those normally applied for heating food does not induce significant inversion of protein-bound amino acids. AS

2252

El-Gazzar (FE), Bohner (HF) and Marth (EH). **Growth of *Listeria monocytogenes* at 4, 32 and 40 C in skim milk and in retentate and permeate from ultrafiltered skim milk.** *Journal of Food Protection* 54(5): 1991: 338-342

Pasteurized skim milk and retentate (concentrated fivefold or twofold by vol.) and permeate from ultrafiltered skim milk were inoculated with *Listeria monocytogenes* strains California or V7 and incubated at 4, 32, or 40 C. Changes in populations of the pathogen were determined, growth curves

were derived, and generation times and max. populations calculated for each combination of strain, product and temp. Both strains grew faster and achieved higher (ca. 1 to 2 orders of magnitude) populations at 4 C in retentate of either concn. than in skim milk. The pathogen grew in permeate at 4 C and attained max. populations of ca. 10^6 to 10^7 /ml. Tyndallized samples of skim milk and retentate and permeate from ultrafiltered skim milk were inoculated with the same strains of *L. monocytogenes* and incubated at 32 or 40 C. Populations achieved by the pathogen at these temp., ca. 10^7 to 10^8 /ml, were similar in skim milk, retentate, and permeate. AS

2253

Garcia (T), Martin (R), Rodriguez (E), Azcona (JI), Sanz (B), Hernandez (PE). **Detection of bovine milk in ovine milk by a sandwich enzyme-linked immunosorbent assay (ELISA).** *Journal of Food Protection* 54(5): 1991: 366-369

A sandwich ELISA was developed for the detection of defined amounts of bovine milk (1-30%) in ovine milk. Polyclonal antibodies were raised in rabbits against bovine whey proteins (BWP). Resultant antibodies were affinity purified by immunoadsorption of the crude antiserum onto columns containing immobilized ovine, caprine, and BWP, followed by elution of the bovine milk specific antibodies (anti-BWP) from the column containing the bovine proteins. The specific anti-BWP antibodies bound to the wells of a microtiter plate were used to capture the BWP from milk mixtures. Further immunorecognition of the captured proteins was attained with the same specific antibodies conjugated to biotin. Extravidin-peroxidase was used to detect the biotinylated antibodies bound to their specific antigens. Subsequent enzymic conversion of substrate gave clear optical density differences when assaying mixtures containing variable amounts of bovine milk. AS

2254

Bear (RJ). **Alteration of the fatty acid content of milk fat.** *Journal of Food Protection* 54(5): 1991: 383-386

Milk fatty acid composition can be influenced by several factors, many of which are interactive. These include stage of lactation, seasonal variation, low milk fat syndrome, feeding, genetic variation, and changes in the energy status of the cow due to administration of bovine somatotropin. Utilization of feeding, genetic variation, and bovine somatotropin should produce a milk fat lower in saturated and higher in unsaturated fatty acids. This may be beneficial to consumers, as many health

professionals are recommending diets lower in saturated fatty acids. Giving consumers the option of purchasing low saturated fatty acid dairy products may also assist in alleviating the current milk fat surplus in the dairy industry. AS

2255

Sanchez (L), Peiro (JM), Castillo (H), Perez (MD), Ena (JM), Calvo (M). **Kinetic parameters for denaturation of bovine milk lactoferrin.** *Journal of Food Science* 57(4): 1992; 873-879

Kinetic parameters for heat-induced denaturation of lactoferrin under different conditions were determined over a temp. range 72-85 C. Denaturation of lactoferrin could be described by first-order reaction kinetics. Lactoferrin is denatured more rapidly in its apo form than in the Fe-saturated form. Both apolactoferrin and Fe-saturated lactoferrin are more heat-sensitive when treated in milk than in phosphate buffer. Values of change in enthalpy of activation of lactoferrin denaturation are high which indicates that a large number of bonds are broken. The association of lactoferrin with β -lactoglobulin does not significantly influence the change in enthalpy of activation of lactoferrin denaturation. AS

2256

Chang (M-K) and Zhang (H). **Carbonated milk: Proteins.** *Journal of Food Science* 57(4): 1992; 880-882

Carbonated milk showed higher viscosity and longer shelf-life than non-carbonated milk. Carbon dioxide serves as a preservative agent in carbonated milk. However, carbonated milk stored at room temp. spoiled as quickly as pasteurized non-carbonated milk. The size of casein micelle particles reduced upon carbonation. Proteins precipitated when carbonated milk was heated at 60 C for 30 min. When heated at 60 C for only 15 min, the carbonated milk proteins were stable. GS

2257

Lee (SY) and Morr (CV). **Fixation and staining milk fat globules in cream for transmission and scanning electron microscopy.** *Journal of Food Science* 57(4): 1992; 887-891

The evaluation and comparison of 3 OsO₄ fixation methods [imidazole-buffered OsO₄ (IBO), ferricyanide OsO₄ (FO) and tricomplex OsO₄ (TCO)] for studying the microstructure of milk fat globule (MFG) and milk fat globule membranes (MFGM) from dairy cream (CREAM) by transmission electron microscopy (TEM) and scanning electron microscopy (SEM), was carried out. Tannic acid-guanidine-HCL mordant treatment and en bloc

staining with p-phenylenediamine was used to increase conductive staining of SEM specimens in order to eliminate the need for metal coating. Results indicated that the 0.5% agarose gel effectively protected the delicate microstructure of MFG from CREAM for examination by SEM and TEM. The 3 methods showed different degrees of presenting MFG and MFGM for visualization by thin-section TEM and SEM. FO and TCO methods preserved the micro-structural details of MFG from CREAM better than the IBO method. GS

2258

Patel (RM), Patel (GK) and Patel (KC). **Physicochemical characteristics of milk fat of surti buffaloes - effect of feed (concentrate mixture and GN cake).** *Journal of the Oil Technologists Association of India* 23(4): 1991; 76-77

Lactating Surti buffaloes were fed with a balanced conc. mixture (containing guar meal 20%, rice bran 30%, maize gluten 28%, red gram husk 20%, mineral mixture 1% and salt 1%) and groundnut cake with or without green grass supplementation. Iodine value (IV), R.M. and Pelshenke values of milk fat were determined before and after 9 months of experimentation. IV of milk fat was higher for groundnut cake fed animals than that fed conc. irrespective of addition of green grass. Feeding of conc. mixture with or without green grass increases the R.M. values; feeding of groundnut cake decreases the R.M. value. Pelshenke value of milk fat increased by feeding conc. mixture of Surti buffaloes. GS

2259

Sharma (AK) and Kuber Ram. **Seasonal variation in consumption pattern of weaker section households with special reference to milk and milk products in Saharanpur district.** *Indian Journal of Dairy Science* 44(8): 1991; 474-478

The study revealed that per capita total expenditure on milk and milk products and expenditure on pure ghee was higher in winter season, whereas expenditure on food items was higher in rainy season. The magnitude of inequality did not vary much in different seasons for per capita total expenditure, expenditure on food items and non-food items. But expenditure on pure ghee and expenditure on milk and milk products showed different degree of inequality in different seasons. The elasticity of food and non-food items did not indicate much variation in different seasons, whereas elasticity of pure ghee as well as milk and milk products was of different order of different seasons. It was also observed that milk and milk products, non-food items and pure ghee was more expenditure elastic than food items. AS

2260

Subrahmanyam (MV), Narasimha Murthy and Bhat (GS). **Distribution of steam volatile monocarbonyls in plasma and lipid phases of milk during different stages of processing.** *Indian Journal of Dairy Science* 44(8); 1991; 496-500

The distribution of steam volatile monocarbonyls (SVMC) in fat and plasma phases during processing of milk to ghee was determined. Higher quantities of SVMC was found in whole milk than in skim milk. About 40% of the total SVMC of whole milk went along with plasma phase while major portions were distributed in fat phase during cream separation. Methyl ketones were found in major portions in both the cases, while SVMC of skim milk contained slightly higher proportions of n-alkanals than that of whole milk. About 66% of SVMC remained with fat phase during churning of cream to butter. Ghee made from butter contained lower quantities of SVMC than butter. Ghee contains only about 53% of SVMC present in butter. AS

Goat milk

2261

Parente (E) and Mazzatura (A). **Growth and heat resistance of *Staphylococcus aureus* in goat milk.** *Italian Journal of Food Science* 3(1); 1991; 27-37

Growth and heat resistance of two strains of *Staph. aureus* in goat milk were studied at different temp. Both strains were unable to multiply at 10 C but reached populations associated with toxin production in 30 h at 20 C and 14 h at 25 C. Values of D = 0.07-0.15 min and z = 4.5-4.8 C were found for heat resistance. *Staph. aureus* could survive subpasteurization treatments and grow during the incubation of milk and cheese at 20 C for several h. the conditions used in manufacturing fresh goat cheeses. AS

2262

Neelam Gupta and Mathur (MP). **Purification of ribonuclease from goat milk.** *Indian Journal of Dairy Science* 44(8); 1991; 529-531

Goat milk ribonuclease eluted as a single peak on IRC-50 and CM-Cellulose column. It was purified to 550-fold. The purified enzyme exhibited an optimum temp. of 50 C and a pH of 9.0. AS

Milk products

2263

Showmaker (CF), Nantz (J), Bonnans (S) and Noble (AC). **Rheological characterization of dairy products.** *Food Technology* 46(1); 1992; 98-102, 104

The rheological properties of dairy products and their relationship to food structure is presented and discusses the results of a study to correlate rheological parameters and sensory texture evaluations of milk. CSA

2264

Holcomb (DN), Pechak (DG), Sumana Chakrabarti and Opsahl (A). **Visualizing textural changes in dairy products by image analysis.** *Food Technology* 46(1); 1992; 122-125, 127

The theoretical model that correlates the rheological and structural data which would allow prediction of the functional properties of a product from its microstructure is covered in this article. CSA

Butter

2265

Miceli (TJ). **Behaviour of polymer-supported tomatine toward cholesterol in the presence or absence of butter oil.** *Journal of Agricultural and Food Chemistry* 39(9); 1991; 1610-1613

Insoluble carboxy-functionalized polystyrene-divinylbenzene copolymers were bonded to tomatine at 0.03 - 0.11 mmol of tomatine/g of polymer. Tomatine was added either to the poly(styrenecarboxyl chloride) or directly to the (carboxymethyl) polystyrene through the mediation of dicyclohexylcarbodiimide. Tomatinized polymers removed cholesterol from hexane sol. of butter oil or cholesterol; however, the complex formed in the presence of butter oil is of low stability. Cholesterol was completely removed and the polymers were regenerated by benzene extraction at room temp. Cholesterol bound to tomatinized polymers is not stable to 2-methyl-1-propanol extraction. Cholesterol uptake by tomatinized polymers was most efficient when hexane was the solvent. AS

2266

Kleyn (DH). **Textural aspects of butter.** *Food Technology* 46(1); 1992; 118-121

Aspects covered in this article are the characteristics of butter, manufacturing of butter (batch method, continuous method), factors affecting the spreadability of butter (seasonal diet, pretreatment of cream, treatment of butter), other approaches to improve the spreadability of butter (whipping,

blending, fractionation and interesterification) and measurement of textural properties. CSA

2267

Sharma (DK) and Balachandran (R). **High temperature vacuum deodorization for renovation of oxidized butter oil.** *Indian Dairyman* 44(6); 1992: 277-279

Oxidized butter oil could be renovated with standardized technique of washing and deodorization. The renovated butter oil which has a bland flavour is used in the preparation of recombined milk of high sensory quality. A fair quality (Grade C) ghee could be made by inducing ghee flavour in renovated butter oil along with cultured butter milk. GS

2268

Pruthi (TD) and Sudhir Kumar. **Effect of browning on recovery of phospholipids from clarified butter fat (ghee) by counter current of distribution technique.** *Indian Journal of Dairy Science* 44(8); 1991: 532-534

Chakka wheys

2269

Jadhav (PE), Kulkarni (MB) and Narawade (VS). **Factors influencing mineral content of Chakka whey.** *Indian Journal of Dairy Science* 44(8); 1991: 510-513

Detailed mineral make-up of *chakka* whey obtained from cow and buffalo milk systems at different stages of synergy of *dahi* was investigated. The study revealed that milk and the stages of draining had a significant ($P < 0.01$) influence on the mineral content of *chakka* whey. Further, it was noticed that the mean Ca, P, Mg, Na and K content in cow whey system at different stages of draining ranged from 101.96 to 126.91, 66.67 to 80.28, 6.20 to 8.69, 43.24 to 45.12 and 132.54 to 137.24 mg/100 ml respectively. The corresponding figures for the buffalo whey system were 121.60 to 192.77, 87.05 to 95.04, 9.02 to 15.78, 26.79 to 34.78 and 88.36 to 97.76 mg/100 ml. The pattern of the mineral distribution in cow and buffalo milk whey systems, as well as, in various stages of draining was complex. A large proportion of these minerals originally present in *dahi*/milk were drained out in the whey systems. AS

Cheese

2270

Konstance (RP) and Holsinger (VH). **Development of rheological test methods for cheese.** *Food Technology* 46(1); 1992: 105-109

Rheological analysis of cheese using various test methods such as empirical and imitative tests, fundamental tests, force-compression, creep, stress relaxation and small-amplitude oscillatory shear and its application to cheese which aids in the prediction of the textural quality of cheese is discussed in this review. 26 references. CSA

Cheddar cheese

2271

Trepanier (G), El Abboudi (M), Lee (BH) and Simard (RE). **Accelerated maturation of Cheddar cheese: Influence of added lactobacilli and commercial protease on composition and texture.** *Journal of Food Science* 57(4); 1992: 898-902

The influence of live and heat-shocked *Lactobacillus casei* - *casei* L2A and Neutrase[®] on the physicochemical and rheological parameters of Cheddar cheese in relation to the acceleration of ripening were studied. Results indicated that moisture, fat and salt percentages were comparable for all cheeses (moisture 51.7 to 52.97%, fat in solids from 51.19 to 53.38% and salt in moisture from 3.92 to 4.54%). Protein was higher in the experimental cheeses than in the control cheeses throughout maturation. Bacterial additives lowered the pH in cheese. The optimum treatment recommended was, LIVE LACTO + HS 1.0% + Neut A. to yield a good-quality matured Cheddar cheese with a flavour increase of 60%. GS

Gouda cheese

2272

Kanawjia (SK), Rajesh (P) and Singh (S). **Research in gouda cheese technology - A review.** *Indian Journal of Dairy Science* 44(8); 1991: 485-495

Gouda cheese is one of the most important Dutch type var. of cheese being produced in the world. In India it has great potential for acceptability by a larger segment of population due to its mild flavour. A great deal of work has been done to standardize the technique for its manufacture using cow and buffalo milk. An acceptable quality Gouda cheese now could be manufactured using microbial rennets. From the economic stand point, research investigation has resulted in achieving a good quality cheese produced within one month through the application of biotechnological means leading to a process of accelerated ripening. AS

Wheys

2273

Morr (CV). **Improving the texture and functionality of whey protein concentrate.** *Food Technology* 46(1): 1992: 110-113

This article describes the variability of commercial whey protein concentrate (WPC) and whey protein isolate (WPI) and possible processing modifications for manufacturing WPC and WPI with improved textural functionality and flavour (removal of low-mol.-wt. components, addition of ions and removal of residual lipids by microfiltration) that more closely resemble those of commercial WPI. CSA

2274

Mangino (ME). **Gelation of whey protein concentrates.** *Food Technology* 46(1): 1992: 114, 116-117

The article describes the electrostatic, covalent and hydrophobic forces that are important to the gelation properties of whey protein concentrates and discusses how composition influences the gel strength. CSA

2275

Yost (RA) and Kinsella (JE). **Microstructure of whey protein isolate gels containing emulsified butterfat droplets.** *Journal of Food Science* 57(4): 1992: 892-897

The effects of concn. and droplet size of anhydrous butterfat globules on the microstructure of heat-induced whey protein isolate gels (pH 4.60) were studied by scanning and transmission electron microscopy (TEM). All fat globules were emulsified with whey protein isolate and incorporated into the system prior to gelation. Protein aggregates became more closely packed as whey protein concn. was increased from 8 to 15% by wt. in gels without added fat. There was no notable change in overall gel microstructure upon addition of fat globules, up to 25% by wt., when viewed by scanning electron microscopy. However, it appeared fat globules were intimately associated with the gel protein matrix. A two-fold difference in fat globule size was obvious by TEM. Clusters of droplets became more predominant as butterfat content increased. AS

Whey proteins

2276

Beuschel (BC), Partridge (JA) and Smith (DM). **Insolubilized whey protein concentrate and/or**

chicken salt-soluble protein gel properties. *Journal of Food Science* 57(4): 1992: 852-855

Properties of gels prepared from 5 whey protein concentrates (WPC) with protein solubilities ranging from 27.5% to 98.1% in 0.1M NaCl, pH 7.0, chicken breast salt-soluble protein (SSP), or a combination of SSP and WPC at pH 6.0, 7.0 or 8.0 were compared. WPC did not form gels when heated to 65 C. SSP gels heated to 65 C were harder than those heated to 90 C at all pHs and hardness decreased as pH was increased. Hardness of combination gels heated to 65 C increased as WPC solubility decreased at all pHs; however, the opposite trend was observed at 90 C. Combination gels of the same WPC solubility at 65 C were more deformable than those heated to 90 C. AS

Milk proteins

2277

Aynie (S), Le Meste (M), Colas (B) and Lorient (D). **Interactions between lipids and milk proteins in emulsion.** *Journal of Food Science* 57(4): 1992: 883-886, 891

The interactions between nitroxide homologs of fatty acids and purified components of milk proteins in a model food emulsion were studied using electron spin resonance. The importance of the interactions in emulsions decreased in the order α_{s1} -casein > β -lactoglobulin > β -casein > whole casein. α_{s1} -Casein resulted in a better organization of the lipid monolayer. Neither the flexibility nor the tertiary structure of the proteins explained this result. It appeared that the interactions occurred through lipid polar heads and protein polar side chains due to hydrogen bonds and/or electrostatic interactions. AS

2278

Gothiwal (PP) and Bhavadasan (MK). **Proteolytic hydrolysis of milk proteins as influenced by browning.** *Indian Journal of Dairy Science* 44(8): 1991: 501-509

Effect of browning as a result of sterilization under different pressure-time combination on the tryptic and peptic hydrolysis in cow and buffalo milk was studied. Proteins from raw buffalo milk were hydrolysed by trypsin to a lesser extent as compared to the proteins from raw cow milk. Sterilization brought about increase in proteolysis, the effect being more in buffalo milk than in cow milk. Moderate browning was accompanied by improved rate of hydrolysis of proteins by trypsin, however, proteolysis in milk having severe browning was observed to be lower than in sample having moderate browning. Cane sugar reduced tryptic

hydrolysis when the milk was heated at 15 psi for 20 min, while heating upto 15 min had only negligible effect. Sterilization increased the rate of peptic hydrolysis of this fraction. The peptic hydrolysis of pH 2.2 insoluble protein fraction from cow and buffalo milk was not significantly affected by heating the milk at 15 psi for different intervals of time and the accompanying browning. Electrophoretic studies revealed that heat treatment involving moderate browning increased the rate of tryptic hydrolysis. While that involving severe browning resulted in decreased tryptic hydrolysis. Electrophoretic studies showed that heating conditions resulting in severe browning of milk also reduced peptic hydrolysis of pH 2.2 soluble protein fraction while it had only marginal effect on pH 2.2 insoluble fraction. AS

MEAT AND POULTRY

Meat

2279

Lind (I). **The measurement and prediction of thermal properties of food during freezing and thawing - a review with particular reference to meat and dough.** *Journal of Food Engineering* 13(4): 1991: 285-319

A literature review on the mathematical modelling of thermal properties and measuring methods is presented. Some measured values of the thermal properties of 3 different food products (unproven white bread dough, minced lean meat and minced lean meat mixed with lard, starch, salt and spices) are presented. The thermal properties of these 3 products are also calculated and compared with measured properties to check the validity of some of the existing formulas currently used for these product types. The importance of the temp. steps when using stepwise differential scanning calorimetry to measure the specific heat and enthalpies is discussed. The results show that there are formulas available for calculating accurately the apparent specific heat and the enthalpy change of these 3 very different food products. The calculations of the thermal conductivity, specific heat and ice content did not agree as well with the measured values, especially in the phase transition region. The apparent specific heat measurements showed the importance of selecting small enough temp. steps. AS

2280

De Zuniga (AG), Anderson (ME), Marshall (RT) and Iannotti (EL). **A model system for studying the penetration of microorganisms into meat.** *Journal of Food Protection* 54(4): 1991: 256-258

This study assessed the effect of line pressure used in spraying meat surfaces on removal of inoculated bacteria and on penetration of Blue Lake, an insoluble dye, into sprayed meat. Pressures used in this analysis were 690, 2070, 4140 and 6200 kPa. The highest pressure, 6200 kPa, removed significantly less aerobic bacteria than the other three lower pressures. No significant differences in removal of *Enterobacteriaceae* were noted due to pressure. Nozzle type was also a variable in the study on penetration. Type of nozzle had a significant effect on the penetration of the Blue Lake into the meat at a pressure of 6200 kPa. An equation describing penetration of the Blue Lake into the meat is given. AS

2281

Shelef (LA) and Yang (Q). **Growth, suppression of *Listeria monocytogenes* by lactates in broth, chicken and beef.** *Journal of Food Protection* 54(4): 1991: 283-287

Sodium or potassium lactate is available commercially as a neutral aqueous sol. (60%), approved for use as a flavouring agent in meat and poultry products. While recommended also for extending shelf-life, little work on its antimicrobial effects has been published and none in relation to *L. monocytogenes*. Studies in tryptic soy broth showed that concn. higher than 5% delayed growth of 3 strains of *L. monocytogenes*. Experiments in sterile comminuted chicken and beef at 35, 20 and 5° showed growth suppression by 4% lactate, which increased with decrease in storage temp. The organism was consistently more sensitive to lactate in beef than in chicken, displaying an extended lag phase of 1-2 wks at 5 C. Combinations of lactate (4%) with NaCl (3%) or nitrate (140 p.p.m.) did not enhance the effect. Lactate did not alter the beef or chicken pH, and no difference was observed between the effect of the two salts, inferring that the lactate ion is responsible for the delay in listerial growth. AS

Beef

2282

Goll (SJ), Kastner (CL), Hunt (MC) and Kropf (DH). **Glucose and internal cooking temperature effects on low fat, pre- and post-rigor, restructured beef roasts.** *Journal of Food Science* 57(4): 1992: 834-840

Addition of glucose to salt and phosphate (LEM-O-FOS) ingredient treatment as well as cooking to 93 C helped in maintaining low warmed-over flavour scores of restructured beef roasts and kept thiobarbituric acid values below

threshold (< 1.0) and maintained desirable consumer acceptability scores. GS

2283

Carter (RA), Plimpton (RFJr), Ockerman (HW), Cahill (VR) and Parrett (NA). **Fabricated beef product: Effect of handling conditions on microbiological, chemical and sensory properties.** *Journal of Food Science* 57(4); 1992: 841-844

Tenderness was more in fabricated beef roasts held at 54 C as compared to those at 60 C. A stabilizing period of 20 min at room temp. (-23 C) did not decrease yield, but caused slight lowering of sensory scores. Sensory evaluation scores were slightly lower with increased holding time (HT). Total microbial count was not adversely affected by lowering the holding temp. of the product from 60 to 54 C or by 12 h HT. GS

2284

Pszczola (DE). **Oat-bran-based ingredient blend replaces fat in ground beef and pork sausage.** *Food Technology* 45(11); 1991: 60, 63, 64, 66

This report provides a brief history on the development of the ingredient blend composed of specially processed oat bran with flavourings and seasonings. It also discusses the benefits that the fat-replacing ingredient offers to the ground beef and pork sausage; its applications and usage level and information on label approval. CSA

2285

Schoeni (JL), Brunner (K) and Doyle (MP). **Rates of thermal inactivation of *Listeria monocytogenes* in beef and fermented beaker sausage.** *Journal of Food Protection* 54(5); 1991: 334-337

2286

Van Laack (RLJM) and Smulders (FJM). **Microbiological condition of restructured steaks prepared from pre- and postrigor beef.** *Journal of Food Protection* 54(5); 1991: 357-359, 365

2287

Aramouni (FM) and Godber (JS). **Folate losses in beef liver due to cooking and frozen storage.** *Journal of Food Quality* 14(5); 1991: 357-365

Pork

2288

Prelusky (DB) and Trenholm (HL). **Nonaccumulation of residues in swine tissue following extended consumption of**

deoxynivalenol-contaminated diets. *Journal of Food Science* 57(4); 1992: 801-802

Residues of deoxynivalenol (DON) in tissues of pigs fed DON-contaminated grains (6.0 - 7.6 mg DON/Kg feed) were not found to accumulate to any appreciable extent. BV

2289

Liu (HF), Booren (AM), Gray (JI) and Crackel (RL). **Antioxidant efficacy of oleoresin rosemary and sodium tripolyphosphate in restructured pork steaks.** *Journal of Food Science* 57(4); 1992: 803-806

Sodium tripolyphosphate (STPP) significantly reduced ($P < 0.01$) lipid oxidation in cooked pork steaks during refrigerated storage (= 4 C) for 8 days and in raw steaks stored at -30 C for 8 months. The addition of oleoresin rosemary (OR) to treatments containing STPP did not show enhancement ($P > 0.05$) of lipid stability. Water soluble OR/STPP also did not result in significant ($P > 0.05$) greater lipid stability than oil-soluble OR/STPP treatments. Hexanal content significantly ($P < 0.01$) increased after 8 months of frozen storage. GS

2290

Prusa (KJ), Fedler (CA), Sebranek (JG), Love (JA) and Miller (LF). **Acceptability and sensory analysis of pork summer sausage from pigs administered porcine somatotropin.** *Journal of Food Science* 57(4); 1992: 819-821

Summer sausage from the porcine somatotropin treated pigs and pork/beef blend was firmer and more chewy than that made from 100% pork. The beef/pork blend sausage was darker, more red and less yellow and was also acceptable more by consumers. GS

Products

2291

Gnanasambandam (R) and Zayas (JF). **Functionality of wheat germ protein in comminuted meat products as compared with corn germ and soy proteins.** *Journal of Food Science* 57(4); 1992: 829-833

Comminuted meat products (CCMP), frankfurters) with protein additives (wheat germ protein flour (WGPF), corn germ protein flour (CGPF), soy flour (SF)) at a level of 3.5% showed increased water-holding capacity and batter stability and decreased cooking loss. Improved viscosity and adhesiveness of meat batters with protein additives were observed when the level of added water was

constant. CMP containing WGPF and SF were firmer than those either containing CGPF or the control having the same level of added water. Protein additives also influenced textural and colour, aroma and flavour of frankfurters. WGPF at level of 3.5% was found similar to effects of SF and CGPF. WGPF, a potential nonmeat protein, can be utilized as an extruder in CMP such as frankfurters and bologna. BV

2292

Taki (GH). **Functional ingredient blend produces low-fat meat products to meet consumer expectations.** *Food Technology* 45(11): 1991; 70, 72, 74

The adaptation of the functional sprinkle-on seasoning to produce low-fat ground beef, sausage and other processed meats, as well as steaks, chops, meat loaf and other meat products for consumer and industrial use are discussed in this article. CSA

Ham

2293

O'Boyle (AR), Aladin-Kassam (N), Rubin (LJ) and Diosady (LL). **Encapsulated cured-meat pigment and its application in nitrite-free ham.** *Journal of Food Science* 57(4): 1992; 807-812

Microencapsulation by spray drying extended the shelf-life of the cooked cured-meat pigment dinitrosyl ferohemochrome (DNFH), to more than 1 yr. of the carbohydrate-based wall materials tested, the cyclic glucose polymer, β -cyclodextrin or combinations of it with gum arabic or maltodextrin, proved most effective. When encapsulated DNFH was dispersed in a nitrite-free pickle sol. and the dispersion treated to reduce particle size, the resultant "homogenized" pickle injected into fresh ham using a multiple-injection unit, and the pumped ham tumbled to accelerate the curing process, more uniform movement of DNFH was facilitated within the ham. An ideal process to produce a fine powder of DNFH within a narrow particle-size range without O₂. Under these conditions, complete dispersions of DNFH within intact meat tissue could be achieved and nitrite-free hams, and other similar cured-meat products, could be produced. BV

2294

Ventanas (J), Cordoba (JJ), Antequera (T), Garcia (C), Lopez-Bote (C), Asensio (MA). **Hydrolysis and Maillard reactions during ripening of Iberian ham.** *Journal of Food Science* 57(4): 1992; 813-815

Active proteolysis and autoxidation occurred during the first period and a strong increase in amino acid and nitrogen was observed in the second period. Content of all the aldehydes decreased notably. GS

2295

Toldra (F), Aristoy (M-C), Part (C), Cervero (C), Rico (E), Motilva (M-J), Flores (J). **Muscle and adipose tissue aminopeptidase activities in raw and dry-cured ham.** *Journal of Food Science* 57(4): 1992; 816-818, 833

Poultry

2296

Brahmkshatri (BP), Upadhyay (NH), Patel (RH), Vataliya (PH), Joshi (RS), Khanna (K). **Inheritance of various egg quality characteristics in male line of white leghorn.** *Indian Journal of Poultry Science* 27(1): 1992; 57-58

The heritability study conducted with male line of White Leghorn indicated that the egg white was highly heritable, shell thickness was moderately heritable, albumen index and yolk index were lowly heritable. Egg wt. showed significant and positive genotypic correlations with shell thickness, albumen and yolk index, Haugh unit and yolk colour. Phenotypically negative correlations for egg wt. were observed with albumen index, Haugh unit and yolk colour. Albumen index and yolk index were significantly correlated genetically and phenotypically. It is concluded that selection for egg wt. will also bring simultaneous improvement in all egg quality traits. KAR

Chickens

2297

Thayer (DW) and Boyd (G). **Gamma ray processing to destroy *Staphylococcus aureus* in mechanically deboned chicken meat.** *Journal of Food Science* 57(4): 1992; 848-851

γ -radiation doses of 0.26 kGy and 0.36 kGy, administered *in vacuo* at 0 C, destroyed 90% of log-phase and stationary-phase CFU of *Staph. aureus* ATCC 13565 (FDA 196E), respectively, in mechanically deboned chicken meat (MDCM). Samples inoculated with 10^{3.9} CFU/g of *Staph. aureus* were treated with γ -radiation *in vacuo* at 0 C and then held for 20 h at 35 C (abusive storage). Viable CFU were found in samples irradiated to 0.75 kGy but not in those irradiated to 1.50 kGy either before or after storage. Enterotoxin was not detected in irradiated MDCM. A predictive equation was developed for the response of *Staph. aureus* in MDCM to radiation dose and irradiation temp. AS

2298

Sams (AR) and Diez (FN). **Characteristics of chicken frankfurters formulated with varying levels of pork and chicken fats.** *Poultry Science* 70(7): 1991: 1624-1629

Varying blends of pork and chicken fat (0:4, 1:3, 2:2, 3:1, 4:0 pork:chicken) were combined with lean (3% fat), hand-deboned chicken meat to determine the effects of substituting pork fat for chicken fat in low (22%) and high (27%) total fat level chicken frankfurter formulations. The addition of pork fat improved instrumental hardness, increased saturated fatty acid content, decreased monounsaturated fatty acid content, and did not significantly affect storage stability of the frankfurters. AS

2299

Anand (SK), Pandey (NK), Mahapatra (CM) and Verma (SS). **Changes in microflora during preparation and storage of chicken tandoori.** *Indian Journal of Poultry Science* 27(1): 1992: 51-53

Microbiological analysis was done at different stages of processing like dressed birds, after seasoning and prepared chicken tandoori stored at 5 plus or minus 1 C for 14 days on alternate days. The average aerobic counts on dressed bird were 5.36 log/g. During seasoning all types of bacteria except psychrotrophs decreased. Cooking chicken tandoori in hot air oven at 175 C for 25 min decreased all bacteria, aerobic plate count reduced by > 2 log cycles, coliforms from 3.05 log to 0.61 log/g and psychrotrophs were completely eliminated. Stored chicken tandoori showed a gradual increase in total aerobes from an initial mean count of 3.32 log to 7.83/g on the 14th day of storage. KAR

Broilers

2300

Bailey (JS), Cox (NA) and Blankenship (LC). **A comparison of an enzyme immunoassay, DNA hybridization, antibody immobilization, and conventional methods for recovery of naturally occurring salmonellae from processed broiler carcasses.** *Journal of Food Protection* 54(5): 1991: 354-356

Three hundred and ninety raw processed broiler carcasses were obtained from 4 processing plants and evaluated for the presence of salmonellae by the whole bird rinse procedure. Enzyme immunoassay (Salmonella-TekTM), colorimetric DNA hybridization (GENE-TRAK^R), and antibody immobilization (1-2 TestTM) methods were compared to the Food Safety

Inspection Service (FSIS) culture method for detection of salmonellae. All samples were preenriched in buffered peptone water incubated at 37 C then transferred to and enriched in TT broth (Difco, Detroit, MI) incubated at 42 C for 24 h. After enrichment, manufacturer's instructions were then followed for "rapid" procedures and the FSIS recovery and confirmation scheme was followed for the cultural method. For each sample, if discrepant results were observed between the 4 procedures, selective plates were streaked from both the TT selective broth and the GN postenrichment broth (Difco). All samples which were positive after initial sampling of TT broth plus additional positive samples from TT selective and GN postenrichment broths were called confirmed cultural positives. Salmonellae were detected on 71% of the carcasses using confirmed cultural procedures and 65% with FSIS culture. Presumptive salmonella positive samples were found 66, 71 and 76% of the time with the 1-2 Test, GENE-TRAK, and Salmonella-Tek, respectively. As compared to confirmed culture, only 1.4% false positives were observed with the 1-2 Test and GENE-TRAK, whereas 6% false positives were obtained using Salmonella-Tek. When the false negatives for the 4 methods were compared to confirmed culture, Salmonella-Tek, Gene-TRAK, 1-2 Test, and FSIS culture had 0.4, 2.5, 7.2 and 8.3%, respectively. The close correlation of these rapid procedures to the conventional procedures warrants consideration of these procedures for detection of salmonellae from broiler chickens. AS

2301

Jones (FT), Axtell (RC), Rives (DV), Scheideler (SE), Traver (FRJr), Walker (RL), Wineland (MJ). **A survey of Campylobacter jejuni contamination in modern broiler production and processing systems.** *Journal of Food Protection* 54(4): 1991: 259-262

Campylobacter jejuni contamination was surveyed in samples collected from the breeder-multiplier houses, broiler houses, feed mills, hatcheries, and processing plants of two integrated broiler firms. Insects and mice were also trapped at each location. *C. jejuni* was most frequently found in samples collected from processing plants, followed by samples collected from broiler houses, and breeder-multiplier houses. Samples obtained from feed mills and hatcheries were negative, suggesting that the *C. jejuni* was not transmitted by either feed or eggs. *C. jejuni* was also not isolated from insect or mouse samples. However, the external surfaces of insects were sanitized with a chlorine sol., prior to analysis. Thus, these data suggest any contamination of insects with *C. jejuni* is generally external not internal. Contamination in broilers apparently originated from some unknown source(s) in broiler houses. *C. jejuni* was isolated from 20%

of the cloacal swabs taken as birds entered the plant, 52% of the carcasses sampled following immersion chilling, and 31.6% of whole broiler carcasses sampled at retail outlets. While these data suggest that cross-contamination occurred within processing plants, field control methods would appear to be necessary for control of *C. jejuni* in modern broiler production and processing systems. The frequent *C. jejuni* isolations from dead birds in broiler houses suggested the regular collection of normal mortality as one farm management procedure that might help reduce *Campylobacter* contamination in broilers. AS

Quails

2302

Singh (RP) and Panda (B). **Physico-chemical and sensory characteristics of brine-chilled frozen quail meat.** *Indian Journal of Poultry Science* 27(1): 1992: 1-5

The influence of brine chilling with or without polyphosphate on chilled carcass yield, brine uptake, cooking loss and frozen storage of quail meat is studied. Non-significant increases in water/brine uptake of carcasses chilled in salt or salt and phosphate brine compared to that of water-chilled control group were observed. Brine-chilling did not show adverse effect by way of excessive wt. gain by the carcasses. Polyphosphate addition to brine sol. significantly reduced cooking loss. Chilling of carcasses in salt alone did not show any effect on meat pH. Addition of sodium tripolyphosphate in brine sol. raised muscle pH, retarded lipid oxidation and showed synergistic effect on increasing myofibrillar proteins extractability and water holding capacity and reduced the cooking loss. GS

2303

Panda (SK) and Singh (RP). **Profitable disposal of quails as battered fried quail product.** *Poultry Gulde* 29(7): 1992: 69-71

The paper describes the preparation of fried whole quail involving precooking, battering, seasoning and deep fat frying to get ready-to-cook quails. Fried quail can be served warm or packed in HDPE pouches (330 gauge) and could be stored for 28 days at 4-5 C and 60 days at -10 C. GS

Turkeys

2304

Bater (B), Descamps (O) and Maurer (AJ). **Kappa-carrageenan effects on the gelation properties of simulated oven-roasted turkey**

breast juice. *Journal of Food Science* 57(4): 1992: 845-847, 868

The soluble proteins in oven-roasted turkey breast juice with 2.2% salt (brine) and 0.5% phosphate started to gel at 52 C. k-carrageenan showed different swelling and gelling behaviour in different conditions; k-carrageenan started to swell at 46 C during heating and gel at 44 C during cooling. When NaCl content was changed to 0% or 4.4% and phosphate content to 0% or 1.2%, k-carrageenan started to swell at 28 C and gel at 36 C, or swell at 67 C and gel at 55 C, respectively. k-carrageenan in combination with turkey breast protein showed a significant ($P < 0.05$) synergistic increase in final gel strength; addition of 0.2% KCl or CaCl_2 further increased ($P < 0.05$) the synergistic effects. BV

2305

Chambers (L), Chambers (E) and Bowers (JR). **Consumer acceptability of cooked stored ground turkey patties with differing levels of phosphate.** *Journal of Food Science* 57(4): 1992: 1026-1028

The acceptability of turkey patties (fresh and stored, cooked, ground) without added phosphate was < those with 0.25% or 0.5% added sodium tripolyphosphate (STPP). Stored samples with 0.5% STPP had more meaty flavour than those without phosphate. Samples containing 0.5% STPP were found less firm and more juicy than the other samples. Consumers also reported higher off-flavour in fresh and stored samples without STPP and; 0.5% STPP-treated samples showed lower off-flavour after storage. BV

Products

Eggs

2306

Hsien (YL) and Regenstern (JM). **Modelling gelation of egg albumen and ovalbumin.** *Journal of Food Science* 57(4): 1992: 856-861

The Flory gelation theory and a new protein gelation model were used to investigate the aggregation reactions of egg albumen and ovalbumin. Results showed that 178 to 267 ovalbumin monomers were required to establish the initial ovalbumin gel at the gel point temp., 81 C. The gel point temp. for egg albumen was 72 C by the Instron and 60 C by protein solubility. The values of the activation energy rate constants for the formation of the different aggregates in the pre-gel stage suggested that the larger ovalbumin aggregates were more reactive than the smaller ones. AS

2307

Hsieh (YL) and Regenstein (JM). **Elastic attributes of heated egg protein gels.** *Journal of Food Science* 57(4); 1992; 862-868

The equilibrium stress of egg white (EW) and ovalbumin (OV) gels using the statistical theory of rubber elasticity suggested that 3.9 covalent disulphide cross-links per OV molecule were formed on gelling. DTNB and PCMB reacted with approx. 4 sulphhydryls of OV in 2% SDS and/or at 82 C. Moreover, the equivalent of 3 secondary bonds, calculated from the initial stress and presumably a composite of numerous weak secondary bonds, contributed significantly to the protein gel stress. AS

2308

Fontana (A), Antoniazzi (F), Cimino (G), Mazza (G), Trivellone (E), Zanone (B). **High-resolution NMR detection of cholesterol oxides in spray-dried egg yolk.** *Journal of Food Science* 57(4); 1992; 869-872, 879

Reports an alternative method for the detn. of cholesterol oxidation in egg powder. The quantitative analysis of cholesterol oxides was carried out by high-resolution proton nuclear magnetic resonance (^1H -NMR). The following oxides were isolated from spray-dried egg powder by rapid chromatographic procedures and detected by selecting "marker" ^1H -NMR signals: 7-ketocholesterol, 7 α -hydroxy-cholesterol, 7 β -hydroxy-cholesterol, cholesterol- α -epoxide and cholesterol- β -epoxide. The quantified cholesterol derivatives ranged from 4.9 to 9.1 p.p.m. with a detection limit of 0.3 p.p.m. (5 μg from 16 g of matrix). The main usefulness of the method should be investigating intermediates and products due to chemical transformation of cholesterol during storage and heating of foodstuffs. AS

2309

Pike (OA), Huber (CS) and Baker (RC). **Acceptability of broken-out eggs stored in polypropylene containers.** *Poultry Science* 70(7); 1991; 1644-1646

The results of the present study indicate that broken-out eggs can be stored at refrigerated temp. in polypropylene containers for at least 3 months and still be as acceptable as shell eggs similarly stored in regard to physical quality, microbial stability, and sensory evaluation. Polypropylene packaging with refrigerated storage could enhance the feasibility of utilizing eggs in spaceflight menus, military rations, and other settings having an environment hostile to shell eggs. BV

2310

Kesava Rao (V), Ravindra Sharma and Kulkarni (VV). **Maintenance of quality of shell eggs.** *Poultry Guide* 29(7); 1992; 43-50

Better methods of collection, storage, packaging, transport, retailing and distribution of eggs to prevent deterioration are discussed. Other aspects included are: processing (cooling and washing) and oil coating of eggs. GS

2311

Germes (AC). **Mechanisms for the decrease in lecithin- P_2O_5 (egg yolk) content in egg noodles.** *Deutsche Lebensmittel-Rundschau* 87(6); 1991; 183-185

The possible reasons (enzymatic degradation and complex formation of lecithin) for a decrease in determined lecithin- P_2O_5 (egg yolk) content during manufacture and storage of egg noodles are reviewed. Recent findings show that autoxidized phospholipids have a strong tendency to form complexes with other compounds support the view that this can also account for an (apparent) reduction in lecithin- P_2O_5 content in egg noodles. 36 references. BV

SEAFOODS

2312

Chinnamma George and Gopakumar (K). **Modified method for the estimation of pentose sugar in molluscan shell fishes.** *Science and Culture* 57(1/2); 1991; 45-47

Molluscan shell fishes such as mussels and clams contain glycogen at very high levels; consequently estimation of pentose sugar by Mejbaum method gives erratic results. By this modified procedure correct values of pentose sugar is obtained. SD

Crustaceans

2313

Renon (P), Biondi (PA) and Malandra (R). **HPLC determination of formaldehyde in frozen crustaceans.** *Italian Journal of Food Science* 3(1); 1991; 59-62

In the present work the content of formaldehyde in frozen crustaceans was evaluated by a method which entails the following steps: a) steam distillation from acidic extract; b) derivatization with 2,4-dinitrophenylhydrazine; c) extraction in hexane; d) analysis of formaldehyde derivative by reversed-phase HPLC with spectrophotometric

detection. The method appears reproducible and suitable for use in routine analysis of formaldehyde in crustacean specimens. AS

Shrimps

2314

Chen (H-C), Huang (S-H), Moody (MW) and Jiang (S-T). **Bacteriocidal and mutagenic effects of ozone on shrimp (*Penaeus monodon*) meat.** *Journal of Food Science* 57(4): 1992: 923-927

The study reports solubility and stability of ozone in liquid phase and the effect of ozone on the inactivation of some bacterial strains suspended in saline or seeded in shrimp meat. The formation of mutagens in shrimp meat soaked with ozone flushing and the ozonolysis of DNA in phages and bacteria when they were treated in ozonated water with concn. used for disinfection was also observed. Results indicated that the saturated concn. (1.4 mg - O₃/L) of ozone in shrimp meat extract (SME) was lower than in 2% saline in distilled water at 5 and 25 C. Ozone exhibited the same decomposition rate ((2.66%)/min) in SME either at 25 or 5 C, within 25 min after ozonation was stopped. *Salmonella typhimurium* was more resistant to ozone in shrimp meat among the 9 bacterial strains tested. Shrimp meat immersed in saline (2%) containing 5 mg - O₃/L, for 120 min, did not show mutagen formation. Ozone in saline (< 5 mg - O₃/L) could lyse M13 RFDNA *Escherichia coli* and single stranded DNA in phage M13 outside bacterial cell, within 30 min. GS

Squids

2315

Nagashima (Y), Ebina (H), Nagai (T), Tanaka (M) and Taguchi (T). **Proteolysis affects thermal gelation of squid mantle muscle.** *Journal of Food Science* 57(4): 1992: 916-917, 922

Thermal gelation of squid mantle muscle was studied by means of gel strength measurement and SDS-polyacrylamide gel electrophoresis (SDS-PAGE). The gel strength of thermally induced squid meat gel decreased when squid meat paste was heated in two steps (35 C for 30 min followed by 90 C for 30 min). This decrease in gel strength was effectively depressed by the addition of protease inhibitors such as ethylenediaminetetraacetic acid (EDTA), phenylmethylsulfonyl fluoride (PMSF), and soybean trypsin inhibitor, indicating that metallo- and/or serine-proteases were mainly involved in the deterioration of squid meat gel prepared by two-step heating. SDS-PAGE analysis demonstrated that EDTA or PMSF suppressed the degradation of myosin heavy chain. AS

Fish

2316

McMeekin (TA), Ross (T) and Olley (J). **Application of predictive microbiology to assure the quality and safety of fish and fish products.** *International Journal of Food Microbiology* 15(1/2): 1992: 13-32

2317

Huss (HH). **Development and use of the HACCP concept in fish processing.** *International Journal of Food Microbiology* 15(1/2): 1992: 33-44

2318

Chan (JK), Gill (TA) and Paulson (AT). **Cross-linking of myosin heavy chains from cod, herring and silver hake during thermal setting.** *Journal of Food Science* 57(4): 1992: 906-912

Electrophoretic results showed that the myosin heavy chain (MHC) was the principal myofibrillar protein cross-linked to form a polymerized complex during the heat treatment. Cross-linking ability of MHC from the 3 fish sp. was different; Herring (*Clupea harengus*) MHC formed only small polymers (n less than or equal to 3) but cod (*Gadus morhua*) and silver hake (*Merluccius bilinearis*) MHC formed both small and large polymers (n greater than or equal to 6). BV

Salmon

2319

Boyle (JL), Lindsay (RC) and Stuijver (DA). **Bromophenol distribution in salmon and selected seafoods of fresh- and saltwater origin.** *Journal of Food Science* 57(4): 1992: 918-922

Analysis of saltwater Pacific salmon (*Ochorynchus* sp.) showed that sufficient concn. of bromophenols were present in saltwater salmon to provide sea-, brine-, or iodine- like flavour notes, but the compounds were virtually absent in spawning run ocean and prime condition Great Lakes freshwater salmon. Octanol/water partition coeff. revealed that bromophenols would be readily absorbed by fish from the diet. Analysis of marine fish, crustaceans, and molluscs also revealed notable concn. of bromophenols in all samples. Only sporadic, low concn. of bromophenols were found in freshwater fish. The data support the hypothesis that simple bromophenols are widely distributed in marine sp. via the food chain. AS

Tuna

2320

Banga (JR), Alonso (AA), Gallardo (JM) and Perez-Martin (RI). **Degradation kinetics of protein digestibility and available lysine during thermal processing of tuna.** *Journal of Food Science* 57(4): 1992; 913-915

Canned white tuna (*Thunnus alalunga*) was subjected to thermal processing with olive oil and the changes in available lysine and protein digestibility were evaluated. Thermal degradation of available lysine in tuna white muscle was a first-order kinetic process. An empirical pseudo n -th order kinetic model, with $n = 13.4$ was found optimum for protein digestibility weighed stochastic non-linear regression and the *Jackknife* procedures are successful in calculating kinetic parameters (k_0 , E_a , n). GS

PROTEIN FOODS

Infant foods

2321

Rossi (M) and Pompei (C). **Changes in liquid milk-based infant formulas during heat treatments.** *Italian Journal of Food Science* 3(1): 1991; 39-47

A basic formula of modified infant milk was subjected to heat treatments of various intensities in industrial plants. The effect of the treatments on various chemical and physical parameters was evaluated. On the basis of the time/temp. profiles relative to both the UHT plants and the hydrostatic sterilizer used for sample sterilization, a C_0 value, expressed as min at 100 C, was assigned to each treatment. Highly significant, linear correlations were observed between heat treatment intensity and lactulose, soluble whey protein and free hydroxymethylfurfural, respectively. This study leads to the conclusion that these 3 parameters are sound indices of heat damage during both UHT and in-container sterilization of modified infant milk. AS

2322

Rossi (M) and Pompei (C). **Changes in liquid milk-based infant formulas during long-term storage.** *Italian Journal of Food Science* 3(1): 1991; 49-57

Samples of modified infant milk produced using heat treatments of different intensities were stored for up to approx. 18 months at 4, 20 and 38 C. The evolution over time of various chemical and physical

parameters was evaluated. Results were processed with a multivariate analysis of the principle components. On the basis of component wts., the most relevant variables were found to be colour difference, pH, NPN, lactulose and non-casein nitrogen (NCN), in that order. Except with regard to NCN, the extent of variation observed during storage was temp. dependent. A practical tool for product quality control, based on pH and lactulose analysis, is proposed. AS

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

2323

Pons (M-N) and Chanel (S). **Effect of heavy metals on volatiles production in alcoholic fermentation by *Saccharomyces cerevisiae*.** *Journal of Fermentation and Bioengineering* 72(1): 1991; 61-63

The effect of inhibition by metals (Cu, Co, Cd and Pb) on the production of volatiles during alcoholic fermentation was investigated by means of a gas membrane sensor connected to a gas chromatograph. Acetaldehyde kinetics were strongly affected by this inhibition, which increased also the fermentation duration and decreased the ethanol and isoamyl alcohol yields. AS

Alcoholic beverages

2324

Falcone (F). **Migration of lead into alcoholic beverages during storage in lead crystal decanters.** *Journal of Food Protection* 54(5): 1991; 378-380

The Pb content of various alcoholic beverages stored in Pb crystal decanters has been determined over a period of 60 wks, using graphite furnace AAS. After 60 wks the levels of Pb ranged from 116 to 2576 p.p.b. Seven of the 9 samples had Pb levels above the max. allowable level of 200 p.p.b. AS

Beer

2325

Hamberg (M). **Trihydroxyoctadecenoic acids in beer: Qualitative and quantitative analysis.** *Journal of Agricultural and Food Chemistry* 39(9): 1991; 1568-1572

Linoleic acid derived 9, 10, 13- and 9, 12, 13-trihydroxyoctadecenoic acids present in beer were subjected to stereochemical analysis by a method recently developed. Although all of the 16 possible isomers were detected, ca. 60% of total

9,10,13- and 9,12,13-trihydroxyoctadecenoates was accounted for by a single isomer, i.e., 9(S), 12(S), 13(S)-trihydroxy-10(E)-octadecenoic acid. A method for quantitative detn. of 9,10,13- and 9,12,13-trihydroxyoctadecenoic acids was developed. Application of the method to 5 samples of beer showed that the mean concn. of 9(S), 12(S), 13(S)-trihydroxy-10(E)-octadecenoic acid was 5.9 plus or minus 1.1 $\mu\text{g/g}$ and that the total concn. of 9,10,13- and 9,12,13-trihydroxyoctadecenoic acid isomers was 9.9 plus or minus 2.1 $\mu\text{g/g}$ of beer. AS

2326

Hay (BA) and Homiski (JW). **Efficient one-step preparation of beer additive tetrahydroiso α -acids.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1732-1734

α -Acids from hop extracts are simultaneously isomerized and hydrogenated to yield tetrahydroiso α -acids, an important additive in beer. The α -acids can also be sequentially isomerized and hydrogenated to tetrahydroiso α -acids, provided the hydrogenation is done between pH 6.0 and pH 11.0. The process is ideally suitable to scale-up and is more cost effective than any other route. The product has a higher purity than material produced by use of other reported methods. Hexahydroiso α -acids, a related beer additive, are also prepared in one step from α -acids. AS

2327

Kaneda (H), Kimura (T), Kano (Y), Koshino (S), Osawa (T), Kawakishi (S). **Role of fermentation conditions on flavour stability of beer.** *Journal of Fermentation and Bioengineering* 72(1): 1991: 26-30

To clarify the role of wort fermentation conditions on the stability of the resulting beer; the flavour stability of beers brewed at several fermentation temp. (6 - 30 C) in a pilot brewing plant (30 l) was studied using chemiluminescence analysis. Chemiluminescence (CL) production in fresh and stored beers increased with fermentation temp. Flavour stability of the beers increased with decreasing fermentation temp. Sulphite content in the fresh beer decreased with an increase in fermentation temp. When sulphite was added to beer, the CL production in beers before and after storage decreased and the flavour stability increased with the concn. of sulphite. These data showed that it was an advantage for beer flavour stability to increase the sulphite level during fermentation. In this pilot study, the CL producing activity had a negative relationship with sulphite content in beer and with flavour stability, indicating that the CL producing pattern of beer is a useful indicator for the evaluation of beer stability in the development of a more stable beer. AS

2328

Kida (K), Ikbal, Sonoda (Y), Kawase (M) and Nomura (T). **Influence of mineral nutrients on high performance during anaerobic treatment of wastewater from a beer brewery.** *Journal of Fermentation and Bioengineering* 72(1): 1991: 54-57

The BOD of wastewater from beer breweries is around 2,000-3,000 mg/l, which is considered to be low-strength wastewater; however, high-strength wastewater, known sometimes as trube wastewater (BOD, about 80,000 mg/l), is also produced as a result of the filtration of wort. This high-strength wastewater was found not to respond well to treatment by a mono-phase thermophilic methane fermentation process using an anaerobic fluidized-bed reactor. Considering the composition of the wastewater and the pathway for methane fermentation, NH_4^+ at 500 mg/l, Ni^{2+} at 7 mg/l, Co^{2+} at 2 mg/l and Fe^{3+} at 30 mg/l were added to the wastewater. After five-fold dilution by vol., the diluted wastewater treated anaerobically in the same manner. As a result, the TOC (total organic carbon) concn. in the effluent was constant at about 400 mg/l, and no further problems were encountered. The volumetric loading rate of TOC was studied by treating variously diluted samples of high-strength wastewater (TOC 15,000, 23,500, 47,000 mg/l). The results obtained with the raw wastewater (TOC 47,000 mg/l) were remarkably good, with a max. volumetric loading rate of TOC of 14 g/l.d, a gas yield of 1.2 l/g TOC consumed and a methane content of 59%. From tests involving omission of the mineral nutrients, it appears that Ni^{2+} and Co^{2+} play important roles in the anaerobic treatment of the wastewater. AS

Whiskeys

2329

Headley (LM) and Haray (JK). **Adulterants in whiskey: Detection and identification by principal component analysis.** *Journal of Food Science* 57(4): 1992: 980-984

Model adulterants such as gasoline, phenol, rubber hose, and hair were added to whiskies to prepare adulterated samples. Methylene chloride extracts of these and of the unadulterated whiskies were separated by capillary column GC. Principal Component Analysis was applied to the gas chromatograms, and the resulting scores were used to decide upon product acceptability. Using a series of standards, scores were also the basis of identification of adulterants in rejected samples. In the largest of 3 data sets, decisions were correct for over 95% of samples, and all adulterated samples were correctly identified. AS

Wines

2330

Miranda-Lopez (R), Libbey (LM), Watson (BT) and McDaniel (MR). **Odor analysis of Pinot Noir wines from grapes of different maturities by a gas chromatography-olfactometry technique (osme).** *Journal of Food Science* 57(4): 1992: 985-993, 1019

The changes in aroma compounds with fruit maturity and vintage were studied using a gas chromatography-olfactometry technique (osme) by comparing the odour quality and number of odour peaks across maturities and vintages of Pinot noir wines. It was observed that odour character varied notably depending upon the climatic conditions in a given harvest season. In the consensus Osmegram, certain peaks appeared, disappeared or changed in odour intensity, depending on the degree of grape ripeness. Wines made with grapes harvested at the end of the ripening period has more odour-active peaks than wines made from fruits harvested before ripening. GS

Rice wine

2331

Ueki (T), Teramoto (Y), Ohba (R), Ueda (S) and Yoshizawa (K). **Application of aromatic red rice bran to rice wine brewing: Studies in red rice wine brewing (Part 2).** *Journal of Fermentation and Bioengineering* 72(1): 1991: 31-35

Rice wines were made from various kinds of rice and/or rice brans. The aromatic red rice wine made from unpolished aromatic red rice (*Oryza sativa* var. *Indica*, *Tapol*), having a wine-like fruity aroma and sour taste, showed the highest quality, while rice wine made from polished aromatic red rice showed a lower quality in an organoleptic test and GC analysis. Rice wines made from the bran of aromatic red rice and red rice, the waste product of the polishing process in *Sekihan* cooking, contained 2.5 times greater amounts of higher alcohols and 3.5 - 5.0 times greater amounts of volatile esters than rice wines made from the bran of glutinous and nonglutinous rices. Thus, the bran fraction of aromatic red rice was essential for the formation of a ruby colour and fruity aroma. Various amounts of aromatic red rice bran were mixed with polished aromatic red rice and also applied to rice wine brewing. Rice wine made from 10 g of bran and 21 g of polished aromatic red rice showed the best quality according to the organoleptic test and GC analysis. The optimal ratio of bran to polished rice as a raw material for rice wine brewing was almost equal to that of native unpolished rice. Aromatic red rice bran was further mixed with polished glutinous rice or nonglutinous rice and applied to rice wine

brewing. The resulting rice wines had a characteristic ruby colour and fruity aroma, just the same as the aromatic red rice wine made from native unpolished aromatic red rice. Thus, not only native unpolished aromatic red rice, but also its bran, could be applied directly and economically to rice wine brewing without the need for any complicated process. AS

Non-alcoholic beverages

Coffee

2332

Guyot (B), Cochard (B) and Vincent (J-C). **Quantitative determination of dimethylsulphide and dimethyldisulphide in coffee aroma. Application to stinking roasted Arabica coffees.** *Cafe-Cocoa-The* 35(1): 1991: 49-56 (Fr)

Fruit juices

Apple juices

2333

Carelli (AA), Crapiste (GH) and Lozano (JE). **Activity coefficients of aroma compounds in model solutions simulating apple juice.** *Journal of Agricultural and Food Chemistry* 39(9): 1991: 1636-1640

Infinite dilution activity coeff. (γ^{infinite}) of several alcohols, aldehydes and esters, considered to be the major components of apple aroma, were measured in model food sol. containing glucose, fructose, sucrose and malic acid. Measurements were made by following the dilution exponential method, at temp. ranging from 25 to 68 C. Experimental data were correlated with the one-parameter Wilson model. The results reveal that γ^{infinite} values for a homologous series increase with the length of the carbon chain. γ^{infinite} values of lower alcohols and esters increase with temp., while γ^{infinite} values for heavier aromas either decrease or remain practically constant with temp. Apple juice solutes increase the activity coeff. of most of the aroma compounds studied. AS

2334

Burda (K) and Collins (M). **Adulteration of wine with sorbitol and apple juice.** *Journal of Food Protection* 54(5): 1991: 381-382

One hundred and thirty-nine Australian wines, including white and red wines, port, sherry and muscat, were analyzed for sorbitol and chlorogenic acid in connection with the adulteration of wine with sorbitol and apple juice, respectively. Sorbitol was

found in 10 wines in the range 3.4 - 6.7 g/L, well above the likely natural level of 0.1 - 1.0 g/L. The detection limit for sorbitol was 0.1 mg/L. In a further 5 wines, chlorogenic acid was found in the range 10 - 31 mg/L. The natural occurrence of chlorogenic acid in wine is < 2 mg/L. The detection limit for chlorogenic acid in white and red wines was 0.5 mg/L and 1.0 mg/L, respectively. AS

2335

Sharma (DD), D'Souza (VF) and Mazza (G). **Psychological and psychometric evaluation of commercial apple juices.** *Journal of Food Quality* 14(5): 1991; 391-405

Five commercial apple juice samples with sugar 9.6 - 10.6%, acid 0.40 - 0.51% and phenolic content 0.12 - 0.23% evaluated showed a correlation of 0.92 between sweetness intensity (log) and sugar; 0.93 between sourness intensity (log) and acid; -0.92 between sourness intensity (log) and sugar/acid ratio; 0.95 between bitter/astringent taste (log) and phenolic content and 0.91 between bitter/astringent taste (log) and acid. Preference ranged from 5.7 - 7.9 and did not correlate with chemical contents or ratios or sensory intensities. Aroma intensity with sugar showed 91% coverage and aroma intensity with sweetness intensity 99% coverage of the preference. SD

2336

Konczal (JB), Harte (BR), Hoojjat (P) and Giacini (JR). **Apple juice flavour compound sorption by sealant films.** *Journal of Food Science* 57(4): 1992; 967-969, 972

An efficient method for analysis of flavour compounds in apple juice is presented; and investigates the sorption of 4 flavour compounds (ethyl-2-methyl-butyrate, hexanal, trans-2-hexenal and 1-hexanol) found in apple juice by selected plastic heat sealable films (LDPE, ethylene/vinyl alcohol ((EVOH) copolymer of high ethylene content, and co-polyester (Co-PET)). The amount of each flavour sorbed by the heat sealable films as a function of storage time varied with the polymer. Sorption of volatiles from apple juice, polymers, EVOH and Co-PET were less sorptive than LDPE, when in direct contact. BV

Ciders

2337

Scott (JA). **The influence of sub-cellular material and pH on cross-flow membrane clarification of cider fermentation broths.** *Journal of the Institute of Brewing* 97(4): 1991; 291-295

The application of cross-flow filtration for clarifying fermentation broths with both micro- and ultra-porous membranes is considered. Steady state fluxes with broths can be less than 10% of clean water values and a significant cause in addition to yeast cells was identified as material with sub-cellular dimensions (found both in the medium and generated during the fermentation). Further work also showed that altering solution pH will also markedly reduce fluxes, in particular those through micro-porous membranes. AS

Kinnow

2338

Ranote (PS), Bawa (AS) and Saini (SPS). **Thermal process for Kinnow-RTS.** *Indian Food Packer* 46(2): 1992; 16-20

The thermal process time of Kinnow ready-to-serve (RTS) beverage based on heat inactivation of pectin methylesterase using improved graphical method were 27 min for bottle and 15 12 min for pouched beverage. Kinnow-RTS beverage, packed in flexible pouch, rigid bottle and metallic containers when stored at 12 - 38 C showed negligible changes in rheology, pH and chemical constituents when evaluated for its shelf-life, during 24 wk storage. During storage sugars increased slightly; residual ascorbic acid and recoverable oil could not be detected. Tintometric colour did not change much. Products in metallic and glass containers were superior in sensory quality than those in pouches; yet flexible pack is recommended because of its energy saving, low cost and time saving. GS

Orange juices

2339

Klavons (JA), Bennett (RD) and Vannier (SH). **Nature of the protein constituent of commercial orange juice cloud.** *Journal of Agricultural and Food Chemistry* 39(9): 1991; 1545-1548

The cloud of 5 commercial orange juice concentrates contained an average of 52.4% protein. Most of the cloud protein was soluble in the chaotropic reagent 10 M urea-6% citric acid, pH 2.5. The cloud of two ready-to-serve pasteurized orange juices showed much the same behaviour as the concentrates, although the total cloud wt. and cloud protein contents were less. Some of the cloud appears to be formed during juice processing. The primary causes of the protein insolubility in the juice are due to inherently insoluble protein, complex formation with low mol. wt. organic cloud constituents, and covalent bonding to other cloud constituents. Protein-pectin complex formation is believed to play only a minor role. AS

Pear Juices

2340

Grewal (VS) and Saini (SPS). **Compositional changes during thermal processing of *Pyrus pyrifolia* juice into concentrate.** *Indian Food Packer* 46(1); 1992: 21-26

Technology for preparing concentrate (60°Brix) from pear is described. The fruit was converted into juice and concn. was carried out in a vacuum evaporator at a vacuum of 28.5 plus or minus 1.5" of Hg and at 50 - 55 C; 320 ml water/h could be evaporated. The energy consumption was 0.75 kg steam per 0.32 kg water. The concn. was single effect, single stage, batch type. During concn. there were changes in flow characteristics; invert sugars improved; total sugars remained constant; pectin and ascorbic acid declined (59%). pH showed no change; juice viscosity increased. Heat treated fruit juice concentrate had better sensory acceptability with higher colour and flavour scores. Possibility of preparing acceptable quality pear juice concentrate has been indicated. GS

FATS AND OILS

2341

Wang (Y) and Gordon (MH). **Effect of lipid oxidation products on the transesterification activity of an immobilized lipase.** *Journal of Agricultural and Food Chemistry* 39(9); 1991: 1693-1695

The effect of varying amounts of linolenic acid hydroperoxides on the activity of an immobilized lipase. Lipozyme, used for the transesterification of fats has been studied. The initial activity of the enzyme is not significantly reduced even by a peroxide value (PV) of 50 mequiv/kg, but the operational stability is reduced if the peroxide value of the oil is above 5 mequiv/kg, with the rate of enzyme inactivation increasing with PV. A sample with initial PV of 50 mequiv/kg caused a 50% loss of activity after 8 batch treatments of 10 h per treatment. The loss of activity is due to generation of free radicals in the enzyme following hydroperoxide decomposition. AS

2342

Bhirud (VS), Subrahmanyam (VVR) and Vaidya (SD). **Preparation of water soluble organic acid esters of monoglycerides using *Mucor miehei* lipase.** *Journal of the Oil Technologists Association of India* 23(4); 1991: 61-63

Lactic, citric and succinic acid esters of glycerol-monostearin are prepared using immobilized *M. miehei* lipase as catalyst. 1-monostearin was prepared by hydrolysis of 1,2-isopropylidene glycerol-ester of stearic acid obtained by using lipase as catalyst. Bread was prepared using oxygen of the monoglyceride or its derived esters. The esters greatly improved the freshness and softness of the bread than the parent monoglyceride. The effect of addition of lactated and citrated 1-monostearin is similar, while both of them are better than succinated 1-monostearin in maintaining the bread quality. GS

2343

Bhirud (VS), Subrahmanyam (VVR) and Vaidya (SD). **Hydrolysis of oils and fats using *Candida rugosa* lipase.** *Journal of the Oil Technologists Association of India* 23(4); 1991: 63-64

Coconut, safflower, soybean, groundnut, rice bran and castor oils having saponification values (SV) of 255, 193.0, 192.7, 194.2, 190.0 and 186.9 respectively were tested for fat splitting. Sal (*Shorea robusta*) and Mahua (*Bassia latifolia*) fats (SV 186.8 and 191.7 respectively) were also investigated. *Candida rugosa* lipase having an activity of 30,000 lipase units (LU) per g was used as the catalyst for fat splitting. The acid value (AV) was determined occurred in coconut, safflower, soybean and groundnut oils in 16 h at 40 C and at a pH of 5.4, with *Candida rugosa* lipase as catalyst. Increasing the pH from 5.4 to 6.4, decreased the hydrolysis by about 10 units in all cases. But for castor oil and rice bran oil, 24 h was needed for 95% hydrolysis. In mahua and sal, high degree of splits were obtained by carrying out the reaction for 24 h but in 16 h the degree of splits achieved was lower. GS

Fats

2344

Kennedy (JP). **Structured lipids: Fats of the future.** *Food Technology* 45(11); 1991: 76, 78, 80, 83

Aspects covered are the medium-chain triglycerides, structured lipids, its advantages (improves immune function, does not impair reticuloendothelial system, lessens cancer risk, helps prevent thrombosis, lowers cholesterol, improves N balance) and implications. CSA

Oils

2345

Nasirullah, Ankaiah (KN), Krishnamurthy (MN) and Nagaraja (KV). **Quality characteristics of edible**

vegetable oil blends. *Journal of the American Oil Chemist's Society* 68(6): 1991: 446-447

Two edible oil blends, namely groundnut oil:rice bran oil and mustard oil:rice bran oil, were prepared in different proportions and stored for a period of three yrs. Their physicochemical characteristics were determined. The results agreed with expected values except for free fatty acid percents and butyrefractometer readings, presumably due to rancidity. Fatty acid compositions of the blends were determined and ratios of characteristic fatty acids, like lignoceric to palmitic for groundnut oil:rice bran oil blends, and erucic to palmitic for mustard oil:rice bran oil blends, were calculated to identify individual oils in the blend. AS

2346

Lanser (AC), List (GR), Holloway (RK) and Mounts (TL). **FTIR estimation of free fatty acid content in crude oils extracted from damaged soybeans.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 448-449

A user-interactive computer-assisted Fourier transform infrared (FTIR) method has been developed for estimation of free fatty acids (FFA) in vegetable oil samples by deconvolution of the infrared (IR) absorbances corresponding to the triglyceride ester and FFA carbonyl bonds. Peak areas were used to determine FFA as a percentage of the total carbonyl areas in weighed standards of refined, bleached, deodorized soybean oil containing from 0 to 5% added oleic acid. These data for percent FFA by FTIR were compared to corresponding FFA data obtained by two titration methods - the AOCS Official Method Ca 5a-40 and the Official Method with a slight modification. Correlation coeff. were 0.999 for the Ca 5a-40, 0.999 for the modified and 0.989 for the FTIR methods. FFA in samples of crude soybean oils extracted from damaged beans (0.5 to 2.1% FFA) were measured by FTIR and compared to data obtained by titration of the same samples (correlation coeff., 0.869). AS

Rice bran oils

2347

El-Zanati (EM) and Khedr (MA). **Separation of saturated and unsaturated acids from rice bran oil.** *Journal of the American Oil Chemist's Society* 68(6): 1991: 436-439

Rice bran oil, a by-product of rice milling, is an excellent source of a variety of fatty acids. Saponification yielded C₁₀ saturated and C₁₈ unsaturated acids. Saturated and unsaturated acids were separated by solvent crystallization. Hexane and methanol were both investigated as

solvents. Gas-liquid chromatography and iodine value showed that hexane was the more effective crystallization solvent at a solvent/oil ratio of three and crystallization temp. of 5 C. The percent yield and purity of 88.8% and 91% unsaturated acids, respectively, and of 65% and 59% saturated acids were obtained. A process description is proposed for an integrated process. AS

Sunflower oils

2348

Onyeneluo (SN) and Hettiarachchy (NS). **Effect of navy bean hull extract on the oxidative stability of soy and sunflower oils.** *Journal of Agricultural and Food Chemistry* 39(10): 1991: 1701-1704

The effectiveness of freeze-dried navy bean hull extract (NBHE) as an antioxidant was evaluated in storage studies with soy and sunflower oils. Monthly peroxide value (PV) detn. indicated NBHE to be a stronger antioxidant than BHA-BHT mixture and rosemary AR but was less effective than TBHQ at all levels (100, 500 and 1000 p.p.m.) and storage conditions (26 and 37 C). At the 100 p.p.m. level, NBHE-treated soy oil attained a PV of 25.4 mequiv/kg at 37 C in 9 months, while the control oil sample had a PV of 62.0 mequiv/kg at the same period. At 26 C, the same concn. of NBHE lowered the PV of soy oil to 14.8 mequiv/kg compared to a PV of 32.7 mequiv/kg attained by the control oil sample for 12 months under the same condition. Similar pattern of PVs were observed in sunflower oil treated with NBHE and stored under the same temp. conditions. AS

SPICES AND CONDIMENTS

Spices

Dills

2349

Nitz (S), Spraul (MH) and Drawert (F). **Gas chromatographic and sensory analysis of dill blossoms (*Anethum graveolens* L.).** *Chemie Mikrobiologie Technologie der Lebensmittel* 13(5/6): 1991: 183-186

The quantitative composition and sensory properties of dill blossom extractives is described. In addition to carvone, anethofuran, limonene, α - and β -phellandrene, which comprises 86% of the total aroma compounds determined by GC, two sensory active substances at trace level (4-vinyl-2-methoxyphenol with a spicy, meat-like note and

4-hydroxy-3-methyl-6-(1-methylethyl)-cyclohex-2-en-1-one with a dill-like, sweet odour) as well as nonacos-10-one, not previously reported as dill constituents, could be identified. AS

Olives

2350

Garcia (P), Brenes (M) and Garrido (A). **Effect of oxygen and temperature on the oxidation rate during darkening of ripe olives.** *Journal of Food Engineering* 13(4): 1991: 259-271

Darkening during ripe olive processing is due to oxidation and polymerization of polyphenols, but there are little quantitative data on these reactions. This investigation shows that the oxidation rate could be improved by higher dissolved O₂ concn., but this produces a more unstable colour than when using air. Increasing temp. also accelerate fruit darkening without adverse effects, though heat can be applied only during the water rinses. As a result of this study, a process that is considerably shorter and produces less waste water is proposed. It consists of treating the olives with a NaOH solution followed by a water rinse at 50 C. After 13-24 h the product has developed a sufficiently good colour to be packed. AS

Turmeric

2351

Polasa (K), Sesikaran (B), Krishna (TP) and Krishnaswamy (K). **Turmeric (*Curcuma longa*)-induced reduction in urinary mutagens.** *Food and Chemical Toxicology* 29(10): 1991: 699-706

Rats were fed turmeric at various levels in the diet for up to 3 months and then exposed to benzo[a]pyrene (B[a]P) or 3-methylcholanthrene (3-MC) by ip injection. Urinary mutagens were detected using the *Salmonella typhimurium* assay. Turmeric fed at 0.5% and above inhibited B[a]P- and 3-MC-mediated mutagenicity. Turmeric did not adversely affect the food intake, or wt. gain of the rats and no histological changes were detected. These findings are significant in view of the widespread exposure of humans to polycyclic aromatic hydrocarbons. The study has also revealed a useful *in vivo* model for testing the antimutagenicity. AS

Tamarinds

2352

Manohar (B), Ramakrishna (P) and Udayasankar (K). **Some physical properties of tamarind**

(*Tamarindus indica* L.) juice concentrates. *Journal of Food Engineering* 13(4): 1991: 241-258

Flow properties of tamarind juice concentrate were studied over a concn. range of 7-62°Brix and a temp. range of 298-343 K using a coaxial cylindrical viscometer. The concentrates showed Newtonian flow behaviour up to a concn. of 19°Brix and pseudoplastic nature beyond 23°Brix obeying the power law relationship. Flow behaviour index for concentrate of 23°Brix is 0.747, whereas it is 0.625 for concentrates of 28-62°Brix. Tamarind juice concentrates were more viscous than sucrose sol. especially at higher concn. Whereas the activation energy of sucrose sol. varies with concn., it does not vary with concn. in the case of tamarind concentrates. Some other engineering properties such as b.p. elevation, specific heat and sp. gr. of tamarind juice and concentrates were determined. The effects of concn. and operating variables on these properties were studied and mathematical models were proposed to relate them to the properties. The b.p. elevation of tamarind juice is twice that of sucrose sol. at 50% solid content and 150 mm Hg absolute pressure. However, the difference is less at lower concn. (below 20% solid content). The specific heat of tamarind juice is < that of sucrose solutions at all concn. The sp. gr. of tamarind juice is approx. equal to that of sucrose sol. of the same concn. AS

SENSORY EVALUATION

2353

Baardseth (P), Naes (T), Mielnik (J), Skrede (G), Holland (S), Eide (O). **Dairy ingredients effects on sausage sensory properties studied by principal component analysis.** *Journal of Food Science* 57(4): 1992: 822-828

The effect of dairy ingredients (1, 3, 5%; ordinary and high-viscosity sodium caseinate (SC), skim-milk powder, whey protein (WP) or demineralized whey powder (DWP)) on sensory properties and instrumental texture and colour of sausages were investigated. The SC gave sausages with higher values of firmness, whiteness, elasticity and rancidity. DWP and WP gave sausages higher graininess, stickiness, colour, fatness, juiciness and smokiness. GS

2354

Bartoshuk (LM). **Sweetness: History, preference and genetic variability.** *Food Technology* 45(11): 1991: 108, 110, 112-113

The history of sweetness, the love for sweetness due to innate pleasantness of sweet taste, sweetness and

endogenous opiates in the newborn, pleasantness of sweetness and metabolic state, 'sweets' as a source of fat and the genetic variability that affect perceived sweetness is explained in this article. CSA

2355

Birch (GG). **Chemical and biochemical mechanisms of sweetness.** *Food Technology* 45(11): 1991; 114, 116, 119-120

This article explains how the transduction of sweet taste begins with the interaction of sweet stimulus with receptor protein. Aspects covered are the sweet glycoprotein which confers the quality of sweetness, the receptor size and shape, apparent molar vol. and its relevance and the persistence of sweet taste. CSA

2356

Noble (AC), Matysiak (NL) and Bonnanas (S). **Factors affecting the time-intensity parameters of sweetness.** *Food Technology* 45(11): 1991; 121-124, 126

This article attempts to explain the application of time-intensity methods for the evaluation of sweetness and interactions with sweetness and examines the factors such as concn., viscosity and temp. which affect the temporal properties of sweetness. CSA

2357

O'Mahony (M). **Techniques and problems in measuring sweet taste.** *Food Technology* 45(11): 1991; 128, 130, 132-133

Various sensory evaluation techniques for the measurement of sweetness such as numerical estimation of sweetness intensity (scaling method), discrimination of fine differences (difference testing method), measurement of a judge's sensitivity to sweetness and descriptive analysis are discussed in this article. CSA

2358

Lindley (MG). **From basic research on sweetness to the development of sweeteners.** *Food Technology* 45(11): 1991; 134, 136, 138

The basic objectives of research on sweet taste which lead to the design of high-potency sweeteners, developing of structure-quality relationships, development of sweetener mixtures as well as greater understanding of sweetness and bitterness, their control and potential commercial benefits are presented in this article. CSA

2359

Ennis (DM). **Modelling the sweet taste of mixtures.** *Food Technology* 45(11): 1991; 140, 142, 145

An overview of the various models (receptor and receptor-transducer models, mixture models), comparison of mixture models using sweet-taste data and the inferences drawn are presented. CSA

2360

Wiet (SG) and Beyts (PK). **Sensory characteristics of sucralose and other high intensity sweeteners.** *Journal of Food Science* 57(4): 1992; 1014-1019

The sensory characteristics of the high potency sweetener sucralose were studied relative to sucrose, aspartame, saccharin, and acesulfame-K in a simple aqueous system. Trained panelists provided sweetness intensity estimated for each sweetener at 6 concn. steps using a magnitude estimation. Taste profiles were obtained using category scaling procedures. Results indicated that (a) sucralose, aspartame, and sucrose had similar taste properties, (b) the psychophysical sweetness function of sucralose was similar to the other sweeteners studied, and (c) sweetness potencies of all sweeteners were concn. dependent with sucralose having the highest potency values ranging from 400 - 700 times the sweetness of sucrose on a wt. basis. AS

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

2361

Garland (EM), Kraft (PL), Shapiro (R), Khachab (M), Patil (K), Ellwein (LB), Cohen (SM). **Effects of *In utero* and postnatal sodium saccharin exposure on the nutritional status of the young rat. I. Effects at 30 days post-birth.** *Food and Chemical Toxicology* 29(10): 1991; 657-667

The incidence of sodium saccharin (NaS)-associated bladder tumours in male rats increases when exposure to high doses begins *in utero* or at birth compared with treatment after weaning. The present exp. evaluated the effect of NaS exposure on selected physiological parameters in young second generation rats. 6-wk-old male and female Sprague-Dawley rats were placed on either a diet supplemented with 7.5% NaS or an untreated diet, and mated 4-6 wk later. Treatment was continued through lactation and the offspring were weaned on

to the same diet. Body wt. were significantly depressed in NaS-treated litters by 4 days after birth, and were 35% lower than controls by 30 days when the animals were killed. NaS treatment of the offspring was associated with an increase in faecal moisture content and caecal content wt., changes in several urinary analytes, a 50% increase in serum cholesterol, a 10-fold increase in serum triglycerides and decreases in serum and hepatic vitamins. In addition, NaS-treated dams and pups were anaemic. Relatively few differences between males and females were noted, but significant inter-litter differences existed. The numerous physiological changes indicate that 7.5% dietary NaS exceeds the max. tolerated dose for weanling rats. AS

2362

Garland (EM), Shapiro (R), Kraft (PL), Mattson (BJ), Parr (JM), Cohen (SM). **Effects of in utero and postnatal sodium saccharin exposure on the nutritional status of the young rat. II. Dose response and reversibility.** *Food and Chemical Toxicology* 29(10): 1991: 669-679

A previous study in the laboratory demonstrated that 30-day Sprague-Dawley rats exposed to 7.5% sodium saccharin (NaS) since conception differ from untreated rats in several physiological parameters. In the present study, to determine the dose response of the changes associated with NaS treatment, animals were evaluated at 30 days post-birth, after treatment with dietary levels of 0, 1, 3 or 7.5% NaS since conception. Most physiological consequences of NaS treatment in the weanling rat, including anaemia and reductions in serum folate and vitamin A concn., were dose dependent. Serum vitamin E, cholesterol and triglyceride concn. were decreased at the two lower doses of NaS but were significantly increased with 7.5% NaS. The no-effect level (NOEL) was similar for physiological effects and for bladder tumor production in two-generation studies (1% NaS in the diet). The reversibility of the effects of 7.5% NaS was examined in 90-day-old rats. The increases in lipids and vitamin E were reversible. Although values for haematological parameters and serum vitamin A remained significantly reduced at 90 days, changes were less severe than at 30 days. Histological examinations revealed that the effects of 7.5% dietary NaS on the bladder were negligible, indicating that the physiological changes observed in the young rat are probably not directly related to the production of bladder tumors. AS

2363

Viswanathan (KR), Narayan Prasad (N), Ramanuja (MN) and Narayanan (VA). **Evaluation of low energy pack ration by short-term feeding to soldiers.** *Defence Science Journal* 41(3): 1991: 263-275

Three identical groups of 15 soldiers were fed with low energy pack (LEP) providing 2100 Kcal; a normal energy pack (NEP) providing 352 kcal and a normal energy fresh (NEF) providing 3631 Kcal for 8 days and compared. LEP ration group lost 1.2 kg body wt. and other two groups maintained their body wt., indicating that the LEP was suitable for short duration. SD

2364

Zunft (H-J). **Food sensitivity. Part II. Food allergy - characteristics and pathological mechanism.** *Ernährungsforschung* 36(1): 1991: 7-11 (De)

Foreign substances penetrating the organism are detected and eliminated by immunological mechanisms. Cells (mainly lymphocytes) and humoral substances (mainly immunoglobulins) take part in these processes. A hypersensitive immune response is called allergy. Allergenic food constituents having overwhelmed the intestinal barrier provoke sensitisation, production of immunoglobulin E, and intestinal, respiratory and cutaneous symptoms. AS

BIOCHEMISTRY AND NUTRITION

2365

Thomas (RL), Cordle (CT), Criswell (LG), Westfall (PH) and Barefoot (SF). **Selective enrichment of proteins using formed-in-place membranes.** *Journal of Food Science* 57(4): 1992: 1002-1005

A process for selective enrichment of immunoglobulins has been developed using formed-in-place membranes on sintered stainless steel tubes. The process employs both size exclusion and protein charge manipulation around the isoelectric point of proteins to selectively reject or pass components of the stream. Vol. recoveries of 95% (20X concn.) could be achieved with a single filtration without loss of fractionation capabilities. The large initial vol. reduction allows for small subsequent diafiltration vol. and insures optimization of fractionation while minimizing total processing vol. The process has been used to enrich proteins representing a small percentage of the total protein from a large feed vol. As an example, immunoglobulin G (IgG) from cheese whey was enriched from 8% to 20% of total whey protein with a 90% recovery of the IgG. AS

TOXICOLOGY

2366

Azer (M) and Cooper (C). **Determination of aflatoxins in foods using HPLC and a commercial ELISA system.** *Journal of Food Protection* 54(4): 1991: 291-294

A commercially available enzyme linked immunosorbent assay (ELISA) system and a HPLC method were used simultaneously to analyze 178 samples of foodstuffs for total aflatoxins. High correlation coeff. values between results of the two methodologies were obtained (> 0.96) with nuts, nut products, peanuts, and peanut butter. However, poor correlation was obtained from results of cereals and grain samples. The ELISA system demonstrated a high degree of reproducibility

between wells ($p < 0.01$). Of the 35 samples of nut and nut products examined, aflatoxins were detected in 5 samples at levels ranging from 40 to 276 $\mu\text{g/kg}$. However, of 73 peanut and peanut butter samples only one peanut sample contained 61 $\mu\text{g/kg}$, and of 70 samples of processed cereal and grain, three samples contained 6-10 $\mu\text{g/kg}$ total aflatoxins. Both methods were also applied to 6 peanut meal samples, with known aflatoxin concn., provided in an interlaboratory collaborative trial. The results obtained by the HPLC and ELISA methods were in close agreement with the mean results obtained by the participating laboratories. AS

FOOD LAWS AND REGULATIONS

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FOOD PROCESSING

2367

Banga (JR), Perez-Martin (RI), Gallardo (JM) and Casares (JJ). **Optimization of the thermal processing of conduction-heated canned foods: Study of several objective functions.** *Journal of Food Engineering* 14(1): 1991: 25-51

A new algorithm ICRS/DS, for the solution of fixed terminal time optimal control problems is presented. It is based on the combination of a robust parameterization of the control function and a computationally efficient nonlinear programming algorithm of unconditional convergence. This algorithm is applied to the optimization of the thermal processing of conduction-heated canned foods, attaining for the first time optimum temp.-time profiles for different objective functions: the max. overall retention of a nutrient, the max. retention of a quality factor at the surface of the solid, and the min. process time. A significant increase of quality factor retention at the surface is achieved with a variable retort temp. profile as against the optimum constant-temp. profile. In the case of process time minimization with a constraint of retention of a quality factor at the surface, the processes with a variable retort temp. show significant advantages over the traditional constant-temp. processes. AS

2368

Reid (DS). **Optimizing the quality of frozen foods.** *Food Technology* 44(7): 1990: 78, 80-82

This article considers the main stages in the production of frozen foods during which significant loss in product quality occur such as the initial processing and preparation prior to freezing, the freezing step itself and the frozen storage which follows freezing. It also discusses about optimizing quality loss by identifying appropriate strategies such as the choice of raw material, preprocessing storage, preparation of raw materials for freezing, control of freezing process itself and frozen storage which provides the greatest potential for quality optimization. CSA

2369

Popper (L) and Knorr (D). **Applications of high-pressure homogenization for food**

preservation. *Food Technology* 44(7): 1990: 84, 86-89

This article describes the effects of high-pressure homogenization on the product temp. and on the structural integrity of the microorganisms and also discusses the combination of high-pressure homogenization with lytic enzymes or chitosan, a natural polycationic polymer which reduces the microbial population and heat treatment damage in foods. CSA

FOOD PACKAGING

2370

Feigenbaum (AE), Ducruet (VJ), Delpal (S), Wolff (N), Gabel (J-P), Wittmann (JC). **Food and packaging interactions: Penetration of fatty food simulants into rigid poly(vinyl chloride).** *Journal of Agricultural and Food Chemistry* 39(11): 1991: 1927-1932

Two complementary methods for the detn. of the extent of polymeric packaging penetration by food simulants which are in contact with rigid poly(vinyl chloride) (PVC) are presented: (i) the depth of penetration of the simulant is measured by optical microscopy of sections slices of the material; (ii) methyl red, dissolved in methyl palmitate, was incorporated in the PVC. Subsequent spectrophotometric analysis of the samples from method (ii) reveals that the penetration of the dye is governed by the penetration of the simulant. Absorbance measurements can thus be used for an indirect evaluation of the penetration of the simulant. Mixtures of olive oil and methyl palmitate have been studied, and general considerations on the use of binary mixtures used as food simulants are discussed. AS

FOOD ENGINEERING AND EQUIPMENT

2371

Bhandari (BR), Dumoulin (ED), Richard (HMJ), Noleau (I) and Lebert (AM). **Flavour encapsulation by spray drying: Application to citral and linalyl acetate.** *Journal of Food Science* 57(1): 1992: 217-221

Leaf flash spray drying technique was used to encapsulate a mixture of two volatile products, citral and linalyl acetate in the proportion of 80:20 (w/w). The support materials were gum arabic and maltodextrin in different proportions. Very short air product contact time during the drying process allowed encapsulation of these compounds using

high inlet air temp. (300 - 400 C) without any adverse effect on chemical properties. Emulsions were atomized up to 60% total solids concn. In this range of concn., substitution of gum arabic by a less costly maltodextrin was possible achieving 84% volatiles retention. The technique could be efficiently used to encapsulate sensitive flavours. AS

2372

Sheen (S) and Hayakawa (K-I). **Parametric analysis for thawing frozen spheroidal (prolate and oblate) or finitely cylindrical food.** *Journal of Food Science* 57(1); 1992; 236-240, 248

A screening analysis was performed to determine the influence of independent parameters (18) on thawing times of frozen spherical (prolate and oblate) and finitely cylindrical foods using a computerized simulation procedure assuming food volume shrinkage from density changes and temp. dependent physical properties. Of 18 independent parameters, 6 were significant for both foods: thawing medium temp., initial freezing point, Biot number, radiative heat exchange, a parameter for effective specific heat and shape factor (nonsignificant influence of volumetric changes). Predictive regression equations were developed for estimating thawing time as function of significant parameters. Predictive equations were validated experimentally. A sensitivity analysis showed errors in thawing time were influenced most strongly by food dimensions, followed by operational temp., thermophysical properties and convective surface heat-transfer coeff. AS

2373

Das (HK), Dobrinov (LM), Akterian (S) and Simov (Z). **Study of the feeding ability of vertical screw during extrusion.** *Journal of Food Science and Technology (India)* 29(5); 1992; 304-306

Surface Response Milling of parameters involved in single-screw extrusion of casein showed that the optimum mass feed rate was achieved at extruder screw speed of 172-192 r.p.m. and at feeding screw speed of 75-95 r.p.m. For the extrusion of a mixture of casein and corn grits (70:30), max. mass feed rate was found at particle size of 0.4 mm. The mass feed rate was decreased by above 1.2 times when extruder screw compression ratio was increased from 1:1 to 3:1. AS

2374

Lind (I). **Mathematical modelling of the thawing process.** *Journal of Food Engineering* 14(1); 1991; 1-23

A short review of models for the calculation of thawing time and simulation of the thawing process is given. The variables which are important for the process are discussed with the emphasis on the heat and mass transfer at the surface of the product. A model for the simulation of thawing time, transient temp. distribution and mass transfer at the surface in convective thawing processes in humid air is presented. The model is found to give comparatively good agreement with experimental results for thawing times, temp. distribution and wt. changes during thawing. AS

2375

Rahman (MS). **Evaluation of the precision of the modified Fitch method for thermal conductivity measurement of foods.** *Journal of Food Engineering* 14(1); 1991; 71-82

A device was developed for measurement of thermal conductivity of solid food materials above and below freezing. The system is a modification of the Fitch apparatus. A disc-shaped sample with a constant thickness is placed in the compartment between a Cu rod and a Cu disc. The disc and rod act as a heat source and sink. The instrument was tested and calibrated by measuring the thermal conductivity of ice, frozen chicken meat (white), fresh potato and apple. AS

2376

Rovinsky (LA). **Hydrocyclones for processing food liquids.** *Journal of Food Engineering* 14(2); 1991; 129-138

A model of the dynamics of the rotating flow of a fluid with suspended particles is presented. The research describes the conditions for particle separation and the dimensions of the separated particles. It further suggests a new design of hydrocyclone, calculation methods for the separation process and design parameters for the apparatus. Calculations are also presented for numerical parameters of hydrocyclones of both types and the latter were compared to evaluate the prospects of hydrocyclone usage for the separation of large fat particles in milk. AS

2377

Narsimhan (G). **A model for unsteady state drainage of a static foam.** *Journal of Food Engineering* 14(2); 1991; 139-165

A model for the unsteady state drainage of a standing foam has been proposed. This model accounted for (i) the liquid drainage from plateau borders due to gravity as well as the gradient of plateau border suction and (ii) the movement of the foam-liquid interface due to the accumulation of

drained liquid, and assumed that the foam bed consisted of dodecahedral bubbles of the same size. The simplifying assumption of a negligible fraction of liquid in thin films, employed in the present model, was justified through the comparison of the time scales of film and plateau border drainage. Typical evolutions of a liquid holdup profile as well as a foam-liquid interface are reported for foam generated by bubbling inert gas through a liquid pool at a constant gas flow rate in the form of bubbles of the same size. The predicted equilibrium liquid holdup profile has been shown to depend only on the density difference, bubble size and surface tension but not on viscosity, surface viscosity and compared well with experimental data. Asymptotic expression for the equilibrium disjoining pressure indicated that larger density difference, larger bubble sizes and smaller surface tensions would tend to make the standing foam less stable. AS

2378

Maroulis (ZB), Kiranoudis (CT) and Marinos-Kouris (D). **Simultaneous estimation of heat and mass transfer coefficients in externally controlled drying.** *Journal of Food Engineering* 14(3): 1991: 241-255

An externally controlled drying model, involving the heat and mass transfer coeff. as model parameters, is proposed. A non-linear regression procedure was applied to fit the model to experimental data on material moisture content and temp. The precision and correlation of the estimated coeff. are examined by considering the joint confidence regions. The method is applied successfully to an industrial belt dryer for moisture removal from raisins. AS

2379

Lepine (FL). **Effects of ionizing radiation on pesticides in a food irradiation perspective: A bibliographic review.** *Journal of Agricultural and Food Chemistry* 39(12): 1991: 2112-2118

The effects of γ -irradiation on pesticides in sol. or in food are reviewed. Degradation of pesticides is generally greater in irradiated aqueous sol. than in aliphatic solvents or in food. Degradation products of some pesticides have been identified in organic solvents, but very few studies of this type have been performed on irradiated food. Addition products between molecules of solvent and pesticides have been observed. These results are discussed in a food irradiation perspective. AS

Equipments

2380

Runyon (CH), Rumsey (TR) and McCarthy (KL). **Dynamic simulation of a nonlinear model of a**

double effect evaporator. *Journal of Food Engineering* 14(3): 1991: 185-201

The nonlinear dynamic behaviour of a double effect evaporator system is modeled. The governing equations were solved using Advanced Continuous Simulation Language (ACSL). Simulations were performed for a commercial double effect tomato paste evaporator using two possible control configurations. Experimental measurements were obtained for a commercial double effect evaporator. Simulation values for feed flow rate and product solids concn. are compared with experimental measurements in response to varying feed solids concn. AS

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

2381

Mistry (B) and Min (DB). **Reduction of dissolved oxygen in model salad dressing by glucose oxidase-catalase dependent on pH and temperature.** *Journal of Food Science* 57(1): 1992: 196-199

Glucose oxidase-catalase showed max. activity at pH 6 and 30 C in the salad dressings. The 0.5% glucose was sufficient to remove 92% of the dissolved oxygen in the salad dressing during 5 days storage. SRA

2382

Phifer (DWJr) and Costello (CA). **Characterization of polypropylene and polyester meltblown materials used for food oil absorption.** *Journal of Food Science* 57(1): 1992: 213-216

Meltblown polypropylene and polyester and paper towels were examined for food oil absorption capacity by wt. difference method. Six food oils (coconut, corn, cottonseed, olive, safflower, and sunflower) were used to include a range of fatty acid compositions. Materials were examined by scanning electron microscopy to note physical characteristics that related to absorption. Polypropylene absorbed 33.4% of the oils compared to 25.1% for polyester and 24.2% for paper towels. This was noted by the large pore size and small diam. fibers forming great numbers of pockets which could

include oil. Polypropylene material should be considered in microwavable packaging as means to decrease dietary fat. AS

2383

Sotelo (A) and Alvarez (RG). **Chemical composition of wild *Theobroma* species and their comparison to the cocoa bean.** *Journal of Agricultural and Food Chemistry* 39(11): 1991: 1940-1943

Theobromine, caffeine, and theophylline content were determined in different parts of the plant in two var. of *Theobroma cacao* and 2 wild *Theobroma* sp., *Th. bicolor* and *Th. angustifolium*. Proximate analysis was performed for the bean, pulp, and shell of the 4 samples, and trypsin inhibitors and hemagglutinins were also investigated in beans and leaves. Fat was the main component in the seeds of all of the samples. The highest levels of alkaloids were found in the seeds of both var. of *Th. cacao*, theobromine being the main alkaloid found: 1.39 and 2.03 g/100 g in seeds of criollo and Costarrica var., respectively. In the *Th. bicolor* the highest concn. of theobromine was in the hull, 915 mg, followed by flowers, 725 mg, and leaves 619 mg/100 g of sample. In *Th. angustifolium*, the highest concn. of theobromine was in the flowers (510 mg/100 g of sample). Caffeine was the second more important alkaloid in the cocoa beans (180 - 920 mg/100 g of sample). In the wild theobroma sp. it was the alkaloid found in the lowest concn. in the seeds; in the flowers of the *Th. bicolor* it was in higher concn. (96 mg/100 g of sample). Theophylline in the *Theobroma* genus has not been previously reported. The highest concn. was found in the seeds of *Th. cacao* (357 - 367 mg/100 g of sample) and in the flowers and leaves of *th. bicolor* (301 and 187 mg/100 g of sample, respectively). Trypsin inhibitor content in the seeds of *Th. cacao* was higher than in the wild sp, 30 - 41 and 8 - 8.6 TUI/mg of sample, respectively. No hemagglutinins were found in any of the four samples studied. AS

2384

Oduoza (CF). **Studies of food value and contaminants in canned foods.** *Food Chemistry* 44(1): 1992: 9-12

Analysis of some shop shelf and immediate factory products of canned tomato purees and orange juices showed that the tomato purees contained higher concn. of heavy metals than the orange juices except Fe. Shop shelf samples of all products contained larger concn. of Fe, Sn and Pb than the factory sausages. However these contaminant levels were within the prescribed limits. The proximate compositions for both the products being lower than the equivalent natural products, compared well with literature values. SD

Chemistry (Analytical)

2385

Karovicova (J) and Polonsky (J). **Determination of synthetic colourants by capillary isotachopheresis.** *Die Nahrung* 35(4): 1991: 403-404

2386

Chen (BH) and Yang (SH). **An improved analytical method for the determination of carotenes and xanthophylls in dried plant materials and mixed feeds.** *Food Chemistry* 44(1): 1992: 61-66

By current AOAC methods, nitrogen gas and antioxidants (BHT) incorporated during extraction and saponification increased carotene and xanthophyll contents from 2 - 4% and 19 - 30% respectively. Similarly extraction and saponification time for 16 h increased xanthophyll to 23% approximately and cold saponification resulted in higher xanthophylls than hot saponification. In the improved method a 1:1 mixture of MgO and diatomaceous earth replaces silica gel as the adsorbent to separate major carotenoids by open column chromatography. A binary solvent system of hexane-acetone and a ternary solvent system of hexane-acetone-methanol in different ratios separate carotenes and other pigments. This method gives substantially high β -carotene and lutein values. SD

FOOD MICROBIOLOGY AND HYGIENE

Enzymes

2387

Meerdink (G) and van't Riet (K). **Inactivation of a thermostable α -amylase during drying.** *Journal of Food Engineering* 14(2): 1991: 83-102

Thermal inactivation kinetics of a thermostable α -amylase were determined experimentally at different water concn. Maltodextrin was used as support material. The inactivation kinetics could be described by a simple first order Arrhenius-type model. Drying exp. with single droplets were carried out in which water concn., temp. and residual α -amylase activity were determined as a function of the drying time. A mathematical model based on the binary diffusion equation and the inactivation kinetics can be developed that describes the inactivation of α -amylase during drying. AS

2388

Peterz (MEG). **Temperature in agar plates and its influence on the results of quantitative microbiological food analyses.** *International Journal of Food Microbiology* 14(1); 1991; 59-66

The numbers of CFU of some strains of Enterobacteriaceae growing in Violet Red bile agar at 44 C can vary considerably depending on incubation conditions and location of an individual agar plate in a stack. The reason is that the heating-up rates of the agar in plates incubated at elevated temp. are slower if the incubators do not have an air circulator and/or if the plates are located in the centre of a stack. Variability in agar temp. among different plates after 24 h of incubation at 44 C was higher if plates were placed in an incubator with an air circulator than in an incubator without one. This effect could be avoided if the plates were incubated enclosed in a plastic bag. AS

Bacteria

Aeromonas hydrophila

2389

Palumbo (SA) and Williams (AC). **Growth of *Aeromonas hydrophila* K144 as affected by organic acids.** *Journal of Food Science* 57(1); 1992; 233-235

The effect of different organic and inorganic acids on the aerobic growth kinetics of *Aeromonas hydrophila* K 144 as a representative strain in culture broth containing 0.5 and 2% NaCl and incubated at 5 and 19 C were studied. Type of acid, pH, NaCl level and temp. influenced lag and generation times of the organic acids (OA) acetic acid and lactic acid prevented growth of *A. hydrophila* K 144 respectively at 5 C and pH 6.0 and pH 5.5. The high NaCl level interacted with type of acid and pH to inhibit microorganism growth at the lower temp. of incubation. The OAS inhibit growth at higher pH values than inorganic acids (HCl and H₂SO₄). Acetic and lactic acids were effective in controlling the growth of *A. hydrophila* and could readily be combined with low holding temp. to render foods free of the organisms. SRA

Listeria monocytogenes

2390

McClure (PJ), Kelly (TM) and Roberts (TA). **The effects of temperature, pH, sodium chloride and sodium nitrite on the growth of *Listeria***

***monocytogenes*.** *International Journal of Food Microbiology* 14(1); 1991; 77-92

An automated turbidimetric system using multiwelled plates was used to examine the effects of different combinations of NaCl (0.5 - 8.0% w/v), NaNO₂ (0 - 400 µg/ml) pH (4.6 - 7.4) and temp. (5 - 30 C) on the growth of *Listeria monocytogenes* in tryptone soya broth. The data presented clearly illustrate the combinations that permit visible growth of the organism. The ability of *L. monocytogenes* to grow at low pH levels was strongly influenced by incubation temp. as well as NaNO₂ concn. At 20 C and below, no visible growth was detected, even with 50 µg/ml NaNO₂ at pH except at higher concn. and also at lower incubation temp. AS

Pseudomonas gladioli

2391

Cadwallader (KR), Braddock (RJ) and Parish (ME). **Isolation of α -terpineol dehydratase from *Pseudomonas gladioli*.** *Journal of Food Science* 57(1); 1992; 241-244, 248

An enzyme which converts the citrus by-product limonene to α -terpineol was purified 13-fold. After cell disruption of *P. gladioli*, α -terpineol dehydratase (α -TD) remained associated with a heterogeneous group of particulate material. α -TD was partially solubilized by extraction with 10 mM HEPES buffer, pH 7.0 containing 2.0% (w/v) Triton X-100 and 0.5M sodium trichloroacetate. Two soluble forms existed in 1.0% (w/v) Triton X-100 with apparent mol. wt. of 94,500 and 206,500 daltons. AS

Salmonella

2392

Skjerve (E) and Olsvik (O). **Immunomagnetic separation of *Salmonella* from foods.** *International Journal of Food Microbiology* 14(1); 1991; 11-18

Salmonella could be separated from different inoculated foods using antibody-coated immunomagnetic beads. When applied on suitable foods, the immunomagnetic separation technique showed a sensitivity of 10 - 20 *Salmonella* cells/g of the original sample. The technology appeared less useful for some food items. AS

2393

Blais (BW) and Yamazaki (H). **Application of polymyxin-coated polyester cloth to the semi-quantitation of *Salmonella* in processed foods.** *International Journal of Food Microbiology* 14(1); 1991; 43-50

A rapid and economical semi-quantitative test for *Salmonella* cells in foods is proposed. Food samples containing different levels of *Salmonella* cells were homogenized and serially diluted in enrichment broths and then incubated for about 20 h at 37 C. The presence of *Salmonella* cells in each dilution was assayed by capturing deoxycholate-extracted *Salmonella* lipopolysaccharides on a sheet of polymyxin-coated polyester cloth, followed by colorimetric detection with an anti-*Salmonella* antibody-enzyme conjugate. The min. dilutions which resulted in no detectable growth were correlated with the extent of *Salmonella* contamination in the food samples. AS

2394

Perales (I) and Erkiaga (E). **Comparison between semisolid Rappaport and modified semisolid Rappaport-Vassiliadis media for the isolation of *Salmonella* spp. from foods and feeds.** *International Journal of Food Microbiology* 14(1): 1991: 51-58

Two semisolid media poured in petri dishes, semisolid Rappaport and modified semisolid Rappaport-Vassiliadis were compared for the recovery of *Salmonella* spp. from 154 high- and low-moisture foods and feeds. Semisolid media were inoculated after pre-enrichment in buffered peptone water and after enrichment in Muller-Kauffmann tetrathionate broth and selenite cystine broth. Also a conventional procedure was used, where the enrichment broths were streaked on Brilliant Green and bismuth sulphite agars. Of 62 samples found positive for *Salmonella* by one or more methods, semisolid Rappaport detected all of them and 60 when inoculated directly from the pre-enrichment broth. Modified semisolid Rappaport-Vassiliadis gave only 20 positive samples. The difference in productivity between semisolid-Rappaport and the other media poured in plates (modified semisolid Rappaport Vassiliadis, Brilliant Green and bismuth sulphite agar) was statistically significant ($P < 0.0001$). The incubation temp. recommended for modified semisolid Rappaport-Vassiliadis (42 C) was found to be too high. By comparison to the other media, semisolid Rappaport gave a 500% increase in the detection of the *enteritidis* serotype of *Salmonella*. AS

Staphylococcus

2395

Pereira (JL), Salzberg (SP) and Bergdoll (MS). **Production of staphylococcal enterotoxin D in foods by low-enterotoxin-producing staphylococci.** *International Journal of Food Microbiology* 14(1): 1991: 19-26

The goal of this investigation was to determine whether staphylococcal strains producing enterotoxins at nanogram levels per milliliter in lab. medium, not detectable by gel diffusion methods, could produce sufficient enterotoxin in foods to result in food poisoning. Three low-enterotoxin D (SED)-producing strains were selected for this research because this enterotoxin is produced in smaller amounts than the other enterotoxins. The foods used were cream pie and cooked ham, divided into two portions, sterile and non-sterile. Each portion was inoculated with known concn. of the staphylococcal strains under study and incubated for 48 h at 25, 30, and 37 C. Samples were taken after 24 and 48 h. Enterotoxin was detectable in both sterilized and unsterilized cream and ham after 24 h at 37 C with an inoculum of 10^3 /g. Some strains produced detectable amounts of enterotoxin in the sterilized foods after 24 h at 30 C and some produced detectable amounts of enterotoxin in the sterilized foods after 24 h at 25 C with inocula of 10^4 /g. It can be concluded that staphylococcal strains producing enterotoxin at ng/ml levels in lab. medium, not detectable by gel diffusion methods, can produce sufficient enterotoxin (ng/g) in foods to cause food poisoning. AS

2396

Wieneke (AA). **Comparison of four kits for the detection of staphylococcal enterotoxin in foods from outbreaks of food poisoning.** *International Journal of Food Microbiology* 14(3/4): 1991: 305-312

Four commercial kits, three based on sandwich ELISA techniques and one on latex agglutination were compared for the detection of staphylococcal enterotoxins in foods from outbreaks of food poisoning. Enterotoxin was detected in 14 of 18 foods with the Swiss SET-EIA and in 9 or 10 with the Unipath SET-RPLA and two ELISAs from Transia. The advantages and disadvantages of the 4 methods are discussed. AS

2397

Notermans (S), Dufrenne (J) and Veld (P). **Feasibility of a reference material for staphylococcal enterotoxin A.** *International Journal of Food Microbiology* 14(3/4): 1991: 325-331

A reference material for staphylococcal enterotoxin A(SEA), was produced by spray-drying the toxin in milk. With the procedure the SEA was distributed homogeneously in the material. For ease of handling the reference material was encased in gelatin capsules, each containing 405 ng of SEA. Simply dissolving the milk powder in distilled water resulted in a 100% recovery of the SEA present. The reference material would appear suitable for testing

laboratory performance, comparison of detection methods and to validation of extraction procedures. AS

Hygiene

2398

Farrell (GM) and Marth (EH). ***Borrelia burgdorferi*: another cause of foodborne illness ?**. *International Journal of Food Microbiology* 14(3/4): 1991: 247-260

Borrelia burgdorferi was identified as the etiological agent of Lyme disease in 1982. This Gram-negative spirochete is classified in the order Spirochaetales and the family Spirochaetaceae. The pathogen is fastidious, microaerophilic, mesophilic and metabolises glucose through the Embden-Meyerhof pathway. A generation time of 11 to 12 h at 37 C in Barbour-Stoenner-Kelly medium has been reported. Lyme disease, named after Lyme in Connecticut, is distributed globally. It is the most commonly reported vector-borne disease in the United States, where the incidence is highest in the eastern and midwestern states. Since establishment of national surveillance in 1982, there has been a nine-fold increase in the number of cases reported to the U.S. Centres for Disease Control. The deer tick of the genus *Ixodes* is the primary vector of Lyme borreliosis. The tick may become infected with *B. burgdorferi*, by feeding on an infected host, at any point in its 2-year life cycle which involves larval, nymphal and adult stages. The infection rate in deer ticks may be as high as 40% in endemic areas. The primary vertebrate reservoirs for *Ixodes* are the white-footed mouse (*Peromyscus leucopus*) and the white-tailed deer (*Odocoileus virginianus*). Dairy cattle and other food animals can be infected with *B. burgdorferi* and hence some raw foods of animal origin might be contaminated with the pathogen. Recent findings indicate that the pathogen may be transmitted orally to lab. animals, without an arthropod vector. Thus, the possibility exists that Lyme disease can be a food infection. In humans, the symptoms of Lyme disease, which manifest themselves days to years after the onset of infection, may involve the skin, cardiac, nervous and/or muscular systems, and so misdiagnosis can occur. AS

2399

Bryan (FL). **Application of HACCP to ready-to-eat chilled foods**. *Food Technology* 44(7): 1990: 70, 72, 74-77

The approaches undertaken by the Hazard Analysis Critical Control Point (HACCP) system which offers the highest degree of food safety for chilled foods prepared in foodservice and food-market establishments involving the detn. of hazards and

assessing their severity and risks, identifying critical control points, developing criteria for control and applying preventive/control measures, monitoring critical control points and taking immediate action to correct the situation whenever the criteria are not met are the aspects discussed in this article. CSA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

2400

Graham (DM), Filer (LJJr) and Bigelow (SW). **Assessing dietary exposure to food additives: A new approach**. *Food Technology* 44(7): 1990: 94, 96

This article attempts to explain how the new method called Dietary Exposure Assessment Method (DEAM) provides per capita consumption estimates of dietary exposure to food additives. CSA

Antioxidants

2401

Chen (C), Pearson (AM) and Gray (JI). **Effects of synthetic antioxidants (BHA, BHT and PG) on the mutagenicity of IQ-like compounds**. *Food Chemistry* 43(3): 1992: 177-183

Ames Test showed that BHA and n-propyl gallate (PG) inhibited the mutagenicity of 2-amino-3-methylimidazo-[4,5-f] quinoline; 2-amino-3,4-dimethylimidazo-[4,5-f] quinoline and 2-amino-3,8-dimethylimidazo-[4,5-f] quinoxaline but whereas BHT had little effect on the first two at low concn.; increased mutagenicity at higher concn. and slightly inhibited the mutagenicity of the latter one at all concn. SD

Colourants

2402

El-Saadany (SS). **Biochemical effect of chocolate colouring and flavouring like substances on thyroid function and protein biosynthesis**. *Die Nahrung* 35(4): 1991: 335-343

Synthetic chocolate colourant, flavourant and the mixture of both, administered to healthy adult male albino rats showed significant increase in serum protein, RNA and thyroid hormone (T_4), while DNA and thyroid hormone (T_3) were insignificantly elevated. The activity of glucose-6-phosphate dehydrogenase (G-6-PO) and 6-phosphogluconate dehydrogenase (6-PGD) in both cytoplasmic and mitochondrial fractions of organs (brain, liver and kidneys) were increased. The rats fed on diets supplemented with the mixture of both colourant and flavourant followed by colourant than flavourant, respectively showed highest increase in G-6-PD and 6-PGD. BV

CEREALS

2403

Uberoi (SK), Vadhera (S) and Soni (GL). **Role of dietary fibre from pulses and cereals as hypocholesterolemic and hypolipidemic agent.** *Journal of Food Science and Technology (India)* 29(5): 1992; 281-283

Inclusion of dietary fibre from seed coat of wheat, maize, *Cicer arietinum* seed (CAS) (green) and soybean in hypercholesterolemic diet, showed no interference with the food intake or its utilization for growth. Fibres lowered the levels of plasma as well as tissue total lipids cholesterol and glycerides, the effect being prominent with soybean and *C. arietinum* seed. In addition, soybean and *C. arietinum* seed fibres appeared to be potent anti-atherogenic agents. The hypocholesterolemic action of fibre could be directly correlated with their bile acid binding capacity and inverse relationship to water holding capacity. In general, higher was the lignin content of fibre, better was the hypocholesterolemic effect. AS

2404

Sauvageot (F) and Blond (G). **Effect of water activity on crispness of breakfast cereals.** *Journal of Texture Studies* 22(4): 1991; 423-442

Extrusion cooked breakfast cereals (commercial-2, experimental-1) placed over 10 saturated salt sol. in desiccator for 3 wks were analysed by sensory, mechanical and differential scanning calorimetric methods. Crispness slightly reduced between 0 and 0.5 a_w or 7% (water content) and afterwards rapidly reduced. The value of critical a_w did not depend on the product. The sensory crispness and deformation showed good correlation to the first fracture. SD

2405

Acquistucci (R) and Pasqui (LA). **A study concerning a method for the rapid determination of semolina colour.** *Die Nahrung* 35(4): 1991; 345-349

Semolina colour is a technological parameter very useful for pasta makers. Studies to test the possibility of measuring semolina colour by employing the b and the L value (yellowness and lightness) for the routine analysis were carried out. Factors which could systematically affect this measurement were also investigated. For this purpose, the relationship between the chemical method of pigments extraction (AACC) and reflectance measurements was examined. The investigation showed that the b value is the most suitable parameter for the evaluation of semolina colour which can be employed for the classification of products. Several variables affect the reflectance measurement but the results of this work suggest that ash and protein amount did not have a recognizable effect on the measurement of b. On the contrary, the L measurement was influenced by the extraction rate of semolina because of the ash amount in flours. AS

2406

Adeyeye (A) and Ajewole (K). **Chemical composition and fatty acid profiles of cereals in Nigeria.** *Food Chemistry* 44(1): 1992; 41-44

The water, oil, ash, protein and carbohydrate were in the ranges 9.4 - 11%, 0.3 - 4.9%, 0.8 - 2.6%, 6.5 - 10.9% and 70.7 - 82.4% respectively for sorghum, millet, maize and rice. The rich mineral concn. varied from 325-450 mg/100 g for K; 180 - 390 mg/100 g for P and 60 - 195 mg/100 g for Mg while Ca, Na, Mn, Fe, Cu and Zn had lower concn. All the grains had high degree of unsaturation (75.8 - 86.4%), high essential fatty acids and fatty acids (stearic, oleic and linoleic); sorghum had the highest protein and essential fatty acids. SD

Barley

2407

Kamini Sood, Dhaliwal (YS), Kalia (M) and Sharma (HR). **Utilization of hulless barley in Chapatti making.** *Journal of Food Science and Technology (India)* 29(5): 1992; 316-317

Addition of hulless barley flour (HBF) to wheat flour increased protein content, but it had diluting effect on the gluten content. The water absorption capacity of blended samples was higher. Puffing of chapatis in all composite flours was satisfactory. Colour, appearance and texture of chapatis were good upto 30% of HBFs in the blends, but flavour

score was slightly decreased. Chewability of chapatti was acceptable upto 40% of HBF in the blend. AS

Paddy

2408

Singaravadivel (K) and Anthoni Raj (S). **Chalkiness in parboiled paddy due to microbial contamination.** *Journal of Food Science and Technology (India)* 29(5): 1992: 312-314

Microbial infection in parboiled paddy caused chalky kernels. Moulds like *Mucor*, *Aspergillus flavus*, *A. fumigatus*, and *A. niger* often occur in parboiled paddy during incomplete yard drying especially in monsoon periods of October-November in coastal Tamil Nadu. Such infection converts the translucent kernels into chalky ones. Re-parboiling reduced the microbial population and improved the head rice recovery. AS

Rice

2409

Palani Muthu (V) and Chattopadhyay (PK). **Thin layer drying characteristics of parboiled milled rice.** *Journal of Food Science and Technology (India)* 29(5): 1992: 275-277

Thin layer drying characteristics of a medium grain parboiled milled rice between temp. range of 40 to 100 C RH range of 4 to 49% were studied. An empirical thin layer drying expression was developed for parboiled milled rice and the constants of the equation were related to the temp. and RH of the drying air. AS

2410

Funaki (J), Abe (K), Hayabuchi (H) and Arai (S). **Modulating the conditioning of meat by the use of oryzacystatin, a cysteine proteinase inhibitor of rice seed origin.** *Journal of Food Biochemistry* 15(4): 1991: 253-262

Frozen meat cubes (2x2x2 cm each) aged 3 days were treated with a 0.1 fold wt. of papain sol. and incubated at 8 C. 2% papain sol. was used for 2 h at 8 C to get the most favourable tenderization. The incubation of a meat cube with papain for the first 2 h and then with an adequate amount of added oryzacystatin for the subsequent 22 h was effective in regulating overtenderization. GS

2411

Raju (GN) and Srinivas (T). **Effect of husk morphology in grain development and**

topography in rice. *Economic Botany* 45(3): 1991: 429-434

Kernels grown within loosened glumes in 3 var. of paddy were darker in colour and had a smoother surface than those grown under normal conditions. The thickness of the pericarp plus seed coat layers was 33.6 plus or minus 2.8 μm , and the thickness of the aleurone layers was 21.7 plus or minus 2.5 μm in grains of the first type, while in the normal grains, these dimensions were 13.0 plus or minus 1.4 and 26.9 plus or minus 2.9 μm respectively. The kernels which developed within loosened glumes tended to taper towards the distal end. They were lighter in wt. than normal grains by 32 to 67%, the wt. loss being less in the bolder var. The lemma-palea interlocking depth was positively correlated with the groove depth on the kernel and with the clearance between husk and kernel. All 3 parameters showed a positive correlation with grain breadth. A low lemma-palea interlocking depth and a smaller clearance between husk and kernel are technologically desirable characteristics in rice. The reclaspings of the 2 glume components after pollination was essential for the normal development of the rice grain. AS

Brown rice

2412

Sabularse (VC), Luizzo (JA), Rao (RM) and Grodner (RM). **Physicochemical characteristics of brown rice as influenced by γ -irradiation.** *Journal of Food Science* 57(1): 1992: 143-145

Brown rice samples prepared from medium grain (Mars) and long grain (Lemont and Tebonnet) var. were irradiated at 0, 1.0, 2.0 and 3.0 kGy and analysed. The amount of solids leached upon cooking increased with increased irradiation dose levels indicating the degradation of the rice grain structure. Damaged starch for 'Mars' decreased to 1.0 kGy level and increased at 2.0 kGy level. Moisture content of rice samples, between 13% and 14% was not significantly affected by irradiation. As the level of γ -irradiation increased, peak viscosity, hot paste viscosity (at the end of 15 min holding at 95 C) and viscosity at 50 C decreased. Increased yellow colour was noticed in rice samples as the radiation increased. SRA

Triticale

2413

Blanchflower (AJ) and Briggs (DE). **Micromalting triticale: Optimising processing conditions.** *Journal of the Science of Food and Agriculture* 56(2): 1991: 103-115

Small-scale trials were carried out to optimise the conditions for micromalting triticale grain, using 3 var. grown in the UK. Compared with barley, triticale grains required short steeping periods with a short air rest. They malted rapidly, and produced malts with high hot water extracts after 4 or 5 days' germination. Applications of gibberellic acid and potassium bromate during malting significantly altered the qualities of malts. Gibberellic acid increased hot water extracts, soluble nitrogen levels and malting losses. When the additives were used in combination, high hot water extracts were obtained and malting losses were reduced relative to controls, but unexpectedly the level of total soluble nitrogen was elevated and did not significantly differ from that obtained using gibberellic acid alone. Both additives usefully reduced wort viscosities, which were unacceptably high by barely malt brewing standards. Wort separation from small-scale mashes was slow. AS

2414

Blanchflower (AJ) and Briggs (DE). **Micromalting triticale: Comparative malting characteristics.** *Journal of the Science of Food and Agriculture* 56(2): 1991: 117-128

Small-scale trials were carried out to compare the malting characteristics of 12 triticale var. harvested in the UK in 1985. Grain samples from 2 locations, each having grain total nitrogen contents of between 1.78 and 2.57% were micromalted. The results established varietal differences in malting quality with respect to grain water uptake, optimum germination period and malt hot water extract. Hot water extracts after a 5-day germination period ranged between 302 and 324 litre⁰ kg⁻¹ with malt yields in the range 87 - 90%. Compared with barley malts, triticale malts possessed extremely high 70 C mash wort viscosities of between 10.4 and 26.9 cSt. The appendix shows the advantages of adjusting x0.2-scale hot water extract mashes to a final wt. of 100 g rather than 90 g. AS

Wheat

2415

Gontard (N), Guilbert (S) and Cuq (J-L). **Edible wheat gluten films: Influence of the main process variables on film properties using response surface methodology.** *Journal of Food Science* 57(1): 1992: 190-195, 199

An edible wheat gluten film was developed and effects of gluten concn., ethanol concn. (ET) and pH of the film-forming sol. on various film properties were evaluated using Response Surface Methodology. pH and ethanol concn. had strong interactive effects on film opacity, water solubility

(WS) and water vapour permeability (WPP). A simultaneous variation of ethanol concn. and pH between 32.5% ET, pH 4 and 45% ET, pH 2 resulted in homogenous and transparent film with relatively low WS. The lowest WPP would be expected with 20% ethanol concn. and pH 6. Mechanical properties were mainly affected by gluten concn. and pH. The most resistant film was obtained at high gluten concn. (12.5%) and pH 5. AS

2416

Gupta (RB), Shepherd (KW) and MacRitchie (F). **Genetic control and biochemical properties of some high molecular weight albumins in bread wheat.** *Journal of Cereal Science* 13(3): 1991: 221-235

Analysis of aneuploid stocks of Chinese Spring wheat showed that some of the seed protein bands separated by two-step SDS-PAGE (M_r 65, 63, 60 and 45k) are controlled by genes on the chromosome arms 4DL, 4AL 5AL and 5DL. The extractability characteristics of these bands indicated that they are albumins. One dimensional SDS-PAGE analysis of protein fractions separated by size exclusion HPLC showed that these albumin bands are part of the polymeric protein fraction in bread wheat. Fractionation of total seed-proteins by diagonal electrophoresis (unreduced x reduced) revealed that high mol. wt. albumin bands occur in both polymeric (disulphide-linked aggregates) and monomeric forms in their native state. These proteins were rapidly degraded during seed germination like the storage proteins of wheat. They were found not to be present in the protein bodies from developing wheat endosperm, however. Subsequent analysis of these albumins using immunoblotting revealed that the bands controlled by chromosome arm 4DL, 4AL and 5AL are β -amylases of wheat grain, and are probably encoded at the β -Amy-1 loci on these arms. A limited amount of allelic variation in these bands was observed by two-step SDS-PAGE of different bread wheat cvs. AS

2417

McCormack (G), Panozzo (J), Bekes (F) and MacRitchie (F). **Contributions to breadmaking of inherent variations in lipid content and composition of wheat cultivars. I. Results of survey.** *Journal of Cereal Science* 13(3): 1991: 255-261

Relationships between test-bake loaf volume and flour lipid parameters were investigated for 14 wheat cvs grown in 3 successive crop years (1984, 1985 and 1986). In 2 of the crop years (1985 and 1986), each cv was grown at 6 levels of N for fertilizer and in 1986 the extra cv was included in the survey. Loaf volumes were measured in an optimized baking test.

Two separate solvent systems were used to extract lipids - light petroleum (b.p. 40 - 60 C) and chloroform. Lipid content was determined by Soxhlet extraction and gravimetric analysis and lipid composition in terms of polar (PoL) and non-polar (NP) components determined by densitometry of TLC patterns. Low but consistent correlations were found between loaf volume and several lipid parameters for each crop year and for each solvent system, in particular, total non-starch lipid (chloroform extract) and NP/PoL ratio. It was estimated that, in the present survey, differences in total lipid could account for up to 5% and the NP/PoL ratio for up to 11% of the variation in loaf volume. AS

Wheat flour

2418

Indrani (D) and Venkateswara Rao (G). **Influence of additives on the rheological and bread making characteristics of differently milled whole wheat flours.** *Journal of Food Science and Technology (India)* 29(5); 1992; 296-298

Effect of potassium bromate and ascorbic acid on the dough and bread making characteristics of whole wheat flour milled in hammer, disc, stone, and roller mills indicated that the improvement in the dough properties varied for the differently milled flours. The breads from hammer and roller milled flours were better in quality than those from disc and stone milled flours. Improvement in the quality of breads due to additives was higher in hammer and roller milled flours than in disc and stone milled flours. AS

Wheat proteins

2419

Inda (AE) and Rha (C). **Dynamic viscoelastic behaviour of wheat gluten: The effects of hydrogen bonding modification by urea and deuterium oxide.** *Journal of Texture Studies* 22(4); 1991; 393-411

Differential scanning calorimetry and photoacoustic ultraviolet spectroscopy study results revealed that the storage and loss moduli of freeze-dried gluten reconstituted with water and deuterium oxide at the same frequency were higher for deuterated gluten. Deuterium oxide does not cause conformational changes in gluten and its main effects is a moderate increase in the strength of hydrogen bonding. For gluten reconstituted with urea, increasing urea concn. reduced frequency dependence of the storage modulus and a large decrease in the magnitude of the loss modulus, especially at low frequencies. The increase in elasticity caused by urea was explained

by the unfolding of the proteins upon disruption of hydrogen bonding. Calorimetric and ultraviolet spectroscopic data confirm that urea and deuterium oxide caused the rheological changes. SD

2420

Du Cros (DL). **Isolation and characterization of two γ -gliadin proteins from durum wheat.** *Journal of Cereal Science* 13(3); 1991; 237-253

Gamma-gliadins 42 and 45, which are correlated with poor and good quality, respectively, in durum wheat, were isolated and characterized. Comparison of the two proteins revealed identity in the sequence of amino acids in their N-terminal regions, but slight differences in their mol. wts. and amino acid compositions. The most significant differences between gliadins 42 and 45 related to variations in the positions of cysteine residues in their amino acid sequences. These differences, coupled with inferred differences in hydrophobicity, may indicate that these proteins may make a contribution to dough properties additional to that of the low mol. wt. glutenin subunits whose coding genes are tightly linked to those of these gliadins. AS

MILLETS

2421

Navita (G) and Sumathi (S). **Effect of primary processing on dietary fibre profile of selected millets.** *Journal of Food Science and Technology (India)* 29(5); 1992; 314-316

Effect of primary processing on dietary fibre (DF) profile of sorghum, bajra, ragi and wheat showed highest and lowest total DF in ragi and bajra. The insoluble fibre content of unprocessed and processed flour samples was found to be high in ragi. Conversely soluble DF content was found to be high in bajra, though its total DF content is low. The total DF content of sorghum bran was found to be low and wheat bran was high. A significant ($P < 0.01$) decrease in total DF and its components in all samples was observed on processing. AS

2422

Ravindran (G). **Seed protein of millets: Amino acid composition, proteinase inhibitors and in vitro protein digestibility.** *Food Chemistry* 44(1); 1992; 13-17

The non-protein nitrogen (NPN) accounted for 17.3, 12.5 and 17% of the total N found in common millet (*Panicum milaceum* 6 var.) finger millet (*Eleusine coracana* 3 var.) and foxtail millet (*Setaria italica* 4

var.) respectively. Millet protein, being deficient in lysine, has adequate levels of other essential amino acids which were comparable between var. The proteins in finger millet were better balanced than the other two var. In millets the anti-tryptic activities were higher than the anti-chymotryptic activities which could not be detected in foxtail var. The low *in vitro* protein digestibility values of raw and uncooked millets improved on cooking. SD

Corn

2423

Barrett (AM) and Peleg (M). **Cell size distributions of puffed corn extrudates.** *Journal of Food Science* 57(1); 1991: 146-148, 154

The cell size distributions of various experimental puffed corn extrudates were determined by image analysis, applied to longitudinal and transversal cross sections. Individual cell cross-sectional area was used as the size measure. All the cell size distributions, regardless of specimen orientation, composition and extrusion conditions, were described mathematically by both the log-normal and Rosin-Rammler distribution functions. The distribution, mean size, degree of skewness or the corresponding distribution functions constants, were characteristic of the extrudate type and its particular cellular structure. AS

2424

Jager (T), van Zuilichem (DJ), de Swart (JG) and van't Riet (K). **Residence time distributions in extrusion-cooking: Part 7 - Modelling of a co-rotating, twin-screw extruder fed with maize grits.** *Journal of Food Engineering* 14(3); 1991: 203-239

The residence time distribution (RTD) of an APV-Baker MPF-50 type co-rotating, twin-screw extruder is measured by a radiotracer technique. Measurements are made with various barrel temp. profiles, feed rates, screw speeds and positions of the barrel valve. The accuracy for the measurement of the av. residence time and the curve width indicators used are within 1%. The measurements are analysed by stepwise regression and compared with a simulation model. A small but systematic deviation between model and measurements can be explained as a stagnation in the kneading elements. The occurrence of this deviation is calculated and discussed with the help of measurements with model liquids in a full-size transparent perspex model. The deviation can be modelled by separate flow systems with different mixing properties or by the introduction of dead volumes. The numerical model can be used as a 'standard' RTD model for

both co- and counter-rotating, twin-screw extruders. AS

2425

Macku (C) and Shibamoto (T). **Volatile antioxidants produced from heated corn oil/glycine model system.** *Journal of Agricultural and Food Chemistry* 39(11); 1991: 1990-1993

The headspace volatiles collected from a mixture consisting of corn oil and glycine heated at 180 C were found to inhibit the aldehyde/carboxylic acid turnover using a newly developed antioxidation test. Among 6 column chromatography fractions of the headspace extract, the fraction that contained 1-methylpyrrole and several of its 2-alkyl homologues was found to show a significant antioxidative effect. Authentic 1-methylpyrrole also exhibited antioxidative activity that increased with the presence of pyridine. The antioxidative strength (wt. basis) of 1-methylpyrrole was comparable to that exhibited by α -tocopherol. AS

2426

Barl (B), Biliaderis (CG), Murray (ED) and MacGregor (AW). **Combined chemical and enzymic treatments of corn husk lignocellulosics.** *Journal of the Science of Food and Agriculture* 56(2); 1991: 195-214

Corn flour

2427

Kulshrestha (K), Mishra (DP) and Chauhan (GS). **Physical and chemical characteristics of maize flour made after lime cooking of grains.** *Journal of Food Science and Technology (India)* 29(5); 1992: 284-286

Physical and chemical characteristics of maize flour cooked with lime water (LHT), water (HT) and raw (UT) were studied. LHT afforded the finest flour among the three treatments as reflected by the optimum water absorption and the particle size index (PSI). Water absorption capacity of maize flour increased significantly after LHT. The α -amylase susceptibility was highest in lime treated flour. The contents of total ash and crude protein of maize flour increased whereas those of crude fibre, fat and carbohydrates decreased after lime as well as heat treatments. AS

Panicum melinis

2428

Stringheta (PC), Bobbio (PA) and Bobbio (FO). **Stability of anthocyanic pigments from *Panicum melinis*.** *Food Chemistry* 44(1); 1992: 37-39

Cyanidin-3-caffeoylarabinosylglucoside and non-acylated cyanidin-3-glycoside were identified as the 2 major pigments from the inflorescences. The stabilities in both light and dark of the partially pure pigments, the pure pigments and of the crude extract of *P. melinis* at pH 2.0. Light strongly affected stability of all in the decreasing order of instability-partially purified anthocyanins, crude extract, pure anthocyanins but they all showed good stability in the dark. SD

Proso millet

Proso millet starch

2429

Yanez (GA), Walker (CE) and Nelson (LA). **Some chemical and physical properties of proso millet (*Panicum milliaceum*) starch.** *Journal of Cereal Science* 13(3); 1991; 299-305

Proso millet starch extracted from 4 cvs had an apparent amylose content slightly higher (29.2 - 32.6%) than that of normal maize. Proso starch digestibility was similar to that of maize. Gelatinization temp. and enthalpy values for proso starch were found to be significantly higher, ($P < 0.05$) than those of maize, suggesting that proso starch has a more ordered and uniform granular structure. The freeze-thaw stability of proso starch gels was less than that of maize starch, but the proso starch gels demonstrated an unusual ability to re-absorb water. AS

PULSES

Cowpeas

2430

Okechukwu (PE), Rao (MA), Ngoddy (PO) and McWatters (KH). **Firmness of cowpea gels as a function of moisture and oil content, and storage.** *Journal of Food Science* 57(1); 1992; 91-95

Cowpea gels (CPG) produced with cold-mixed cowpea flour slurry (CPFS) showed large firmness gradients. Firmness gradients of CPG were small when the cowpea flour slurries were hot-mixed and held for 30 - 60 min at 70 C; the gradients decreased with increase in fat, moisture, and salt contents; it increased with storage and the increase was higher at lower storage temp. SRA

Faba beans

Faba bean flour

2431

Shashi Gaur, Sharma (YK), Bera (MB) and Keshervani (GP). **Nitrogen solubility of raw and autoclaved faba bean flour.** *Journal of Food Science and Technology (India)* 29(5); 1992; 286-288

Nitrogen solubilities of raw and autoclaved faba bean flour, over 1 - 13 pH range and in 3 dispersion media (water, 0.1 M NaCl and 1.0 M NaCl), indicated increase below and above the isoelectric pH (4.4). Higher salt concn. reduced N solubility. Analysis showed that pH is the primary determinant of N solubility. AS

Lupines

2432

Camacho (L), Sierra (C), Marcus (D), Guzman (E), Campos (R), von Baer (D), Trugo (L). **Nutritional quality of lupine (*Lupinus albus* cv. Multolupa) as affected by lactic acid fermentation.** *International Journal of Food Microbiology* 14(3/4); 1991; 277-286

The effects of selected NRRL strains of *Lactobacillus acidophilus*, *L. buchneri*, *L. cellobiosus* and *L. fermentum* upon oligosaccharide, phytate and alkaloid contents, as well as on the nutritive value of lupine, were investigated. Lupine was processed to a 12% total solids suspension, inoculated with 1% (v/v) cultures and fermented until a final desired pH of 4.5. *L. acidophilus* B-2092 and *L. buchneri* B-1837 growth was related to a significant sucrose breakdown and decreases of phytates, whereas *L. acidophilus* B-1910 and *L. fermentum* B-585 reduced the content of flatulence oligosaccharides. The activity of *L. acidophilus* B-1910 was particularly associated with lowering of alkaloids and increase of riboflavin. Lactic acid fermentation produced slight changes in lysine and methionine contents. No significant differences in net protein ratio values and protein digestibility were found between fermented and unfermented lupine ($P < 0.05$). A 1:1 ratio mixture of B-1910 and B-2092 strains of *L. acidophilus* lead to a final fermented lupine with nutritional advantages to those given by the individual cultures. AS

Prosopis

2433

Odibo (FJC), Ugwu (DA) and Ekeocha (DC). **Microorganisms associated with the fermentation of Prosopis seeds for Ogiri-okpei production.** *Journal of Food Science and Technology (India)* 29(5); 1992; 306-307

Microorganisms associated with the fermentation of *Prosopis* seeds for the production of Ogiri-okpei were identified as *Bacillus subtilis*, *Staphylococcus aureus*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Enterobacter cloacae* and *Lactobacillus plantarum*. The pH of the fermenting seeds dropped to 5.0 while temp. rose to 38 C at the end of fermentation. AS

Red beans

2434

Cho (Y) and Park (K). **Purification of cellulase from *Fusarium moniliforme* and its application to the production of red bean starch precipitate.** *Journal of Food Biochemistry* 15(4); 1991; 295-313

To investigate the effect of cellulase on increase of recovery of red bean starch precipitate, cellulases from *Fusarium moniliforme* were purified and applied to the production of red bean starch precipitate. One β -glucosidase, two filter paper degradation enzymes (FPase), one endo- β -glucanase (endo-Cx) and one exo- β -glucanase (exo-Cx) were purified by ammonium sulphate fractionation, gel filtration and ion-exchange chromatography. Optimum temp. and time of submersion of red beans for reduction of hardness was 50 C and 2 h. Max. sedimentation rate of starch was obtained when the red bean was incubated in a mixture of 0.004 units/mL of FPase and 0.3 units/mL of CMCase, and max. recovery of red bean starch precipitate was obtained with 0.004 units/mL of FPase and 0.2 units/mL of CMCase. Enzyme treatment reduced suspended solids about 40% in waste water compared with control. A little hydrolysis in cell wall, intercellular space and interstarch granular space was observed. AS

Red kidney beans

2435

Ahn (JK), Sen (LC) and Whitaker (JR). **Stability of tertiary structure of phaseolin of red kidney bean (*Phaseolus vulgaris*) as limiting factor in proteolysis.** *Journal of Food Biochemistry* 15(4); 1991; 263-278

The major storage protein, phaseolin, of red kidney bean (Linden var.) was purified by ammonium sulphate fractionation between 3 and 4.1 M. It was composed of 3 subunits with MW 49,000, 45,000 and 42,000 and there were no disulphide bonds. Phaseolin was treated with heat (121 C, 15 min), pH (1.0, 7.5, 9.0), urea (2 to 10 M), guanidine (3 to 8.5 M) and alkali (0.02 N NaOH) at 35 C to destabilize the tertiary structure. Increase of *in vitro* proteolysis by the prior treatments was estimated with

chymotrypsin, trypsin, pepsin and pronase. Native phaseolin was more resistant than Hammarsten casein to hydrolysis by chymotrypsin, trypsin, pepsin and pronase. An equimolar mixture of chymotrypsin and trypsin gave lower proteolysis than the sum of hydrolysis by each proteinase separately. Chymotrypsin hydrolysis products of phaseolin inhibited trypsin, and trypsin hydrolysis products of phaseolin inhibited chymotrypsin. All the treatments listed above enhanced *in vitro* proteolysis. Phaseolin treated with 0.02 M NaOH had higher hydrophobicity and higher absorbance between 240 and 350 nm than native phaseolin, indicating that its tertiary structure was destroyed. Autoclaving at pH 7.5, treatment with 8.5 M guanidine or with 0.02 M NaOH increased the extent of proteolysis of phaseolin to a similar or higher level than Hammarsten casein. Guanidine (8.5 M) destroyed the tertiary structure of phaseolin sufficiently that almost all susceptible bonds were hydrolyzed by pepsin, chymotrypsin and trypsin (and probably pronase). AS

OILSEEDS AND NUTS

Bambarra groundnut

2436

Ojinelukwe (PC) and Ayernor (GS). **Oligosaccharide composition and functional properties of flour and starch isolates from four cultivars of bambarra groundnut seeds.** *Journal of Food Science and Technology (India)* 29(5); 1992; 319-321

Proximate composition of flour and starch isolates of Bambarra groundnut seeds, showed that whole seeds contained 19 - 22% protein, 6-9% fat, 53-56% total carbohydrates and 4-12% soluble carbohydrates. Flatulent sugars as revealed by chromatography ranged from 1.0 to 2.6%. Water holding capacities of cvs varied between 4.0 and 7.2 g of water/g of flour. Brabender amylograph indicated that starch gelatinized between 65 and 74 C, formed stable paste and showed moderate swelling capacity. AS

Cashew nuts

2437

Shobha (SV) and Ravindranath (B). **Supercritical carbon dioxide and solvent extraction of the phenolic lipids of cashew nut (*Anacardium occidentale*) shells.** *Journal of Agricultural and Food Chemistry* 39(12); 1991; 2214-2217

Supercritical carbon dioxide extraction of raw cashew nut shells yielded 18.7% by wt. phenolic

lipids in 17.5 h. Composition of the cashew nut shell liquid (CNSL) thus obtained was quantitatively analyzed using high-performance reversed-phase liquid chromatography. The analytical data were compared with those of solvent-extracted CNSL from India (both raw cashew nuts and steam-processed cashew nuts), Brazil, Kenya, and Mozambique. Indian CNSL is richer (by about 10%) in anacardic acids, and extraction by supercritical carbon dioxide yields a better quality product. Steam-processed cashew nut shells retain about 80% of the anacardic acids. AS

Coconuts

2438

Mathew (AG). **Processing of coconut in India.** *Journal of Plantation Crops* 19(2); 1991; 183-190

Chemical composition of coconut and the uses of coconut, oil and coconut water are reviewed. Other aspects covered are drying of coconut, milling of copra and production of desiccated coconut. 11 references. BV

Cottonseeds

Cottonseed products

2439

El-Nockrashy (AS) and El-Shattory (Y). **Phospholipid constitution of cottonseed products during different processing operations.** *Grasas y Aceites* 41(4-5); 1990; 342-346

Cooking of cottonseed increased the phospholipid content of the oil. As a result of hydraulic pressing HP, prepressing and solvent extraction SE operations, the percentages of phospholipids in the retained oils are always higher than that found in the recovered crude oils. Crude HP oils contain less than half the amount found in the oils extracted from the cake. Crude SE oils contain higher phospholipid percentages than crude HP oils. The refining operation results in freeing the crude oils from the greater part of the phospholipids. Although the percentages of individual phospholipids in the oils differ with the nature of the samples, yet they bear more or less the same ratio to one another. The average percentages of all samples are: phosphatidyl inositol 9.3, lysolecithin 5.7, phosphatidyl serine 20.2, lecithin 26.3, phosphatidyl ethanolamine 17.7 and an unknown phospholipid 12.7. AS

Groundnuts

2440

Marshall (HFJr), Ross (LF), Conkerton (EJ), Chapital (DC) and Kvien (CK). **Effect of diniconazole on the free amino acids and carbohydrates of peanut, *Arachis hypogaea* L.** *Oleagineux* 46(8/9); 1991; 329-332

Linseed

2441

Susheelamma (NS), Naginchand and Rajalakshmi (D). **Modelling the gelling behaviour of linseed polysaccharide.** *Journal of Texture Studies* 22(4); 1991; 413-421

The gelling behaviour of linseed polysaccharide was measured in the presence of sucrose as a function of both polysaccharide and sucrose concn. Yield stress, consistency index, and flow behaviour index were determined using the Herschel-Bulkley model. Transition concn. of 0.7% for the polysaccharide and 55% for sucrose were found. Yield stress and consistency index increased with both polysaccharide and sucrose concn. while flow behaviour index decreased. A polynomial model of the third degree on centred data after natural log transformation was found to give a satisfactory fit for the variations in rheological constants. The models for both yield stress and consistency index were a complex power law, and for flow behaviour index a complex semi-log relationship, on sucrose and polysaccharide concn. AS

Rapeseeds

2442

Lange (R) and Linow (F). **About sulphur containing compounds in rape (*Brassica napus*) species and their processing products. Part 5. Determination of total glucosinolate content via glucosinolate-palladium-complex.** *Die Nahrung* 35(4); 1991; 379-384 (De)

Aspects of palladium-glucosinolate-complex formation are studied with regard to the detn. of total glucosinolate content. With standards the absorption behaviour of the palladium-complexes is examined in dependence on the structure of the glucosinolates. Glucosinolate mixtures from seeds of different Cruciferae are classified with reference to the differences in the absorption data of their palladium complexes. The classification leads to groups of substrates corresponding to the dominant glucosinolates and the genotypes of the seeds. It is recommended to analyse simultaneously substrates of the same group only. The usefulness of the substrate classification is documented by the analysis of seeds from rape var. AS

2443

Lange (R), Petrzika (M), Raab (B) and Linow (F). **About sulphur containing compounds in rape (*Brassica napus*) species and their processing products. Part 6. Estimation of glucosinolates by HPLC-mass spectrometry.** *Die Nahrung* 35(4): 1991; 385-389 (De)

The estimation of glucosinolates in rape seeds by HPLC-thermospray MS is discussed. The chromatographic separation parameters (relative response time) of these compounds and the characteristic ions in the thermospray mass spectra are described. The applicability of the procedure is checked by the analysis of the glucosinolate pattern from seeds of licensed rape var. AS

Sesame

2444

Yuno-Ohta (N), Maeda (H), Okada (M) and Hasegawa (K). **Formation of transparent gels of sesame 13S globulin: Effects of fatty acid salts.** *Journal of Food Science* 57(1): 1992; 86-90

The physicochemical properties of sesame 13S globulin gels containing fatty acid salts (FAS) were investigated. The softness, water-holding ability (WHA) and transparency of the gels markedly increased in the presence of sodium oleate ($\text{NaC}_{18:1}$) or sodium linoleate ($\text{NaC}_{18:2}$) at a 75 molar ratio to a molecule of the 13S globulin. The effect was not observed by the addition of sodium caprylate ($\text{NaC}_{8:0}$). Scanning electron microscopy showed that a very fine network structure was formed in the gel with 75 molar ratio of $\text{NaC}_{18:2}$. The addition of a suitable amount of FAS having a moderate length and an unsaturated carbon chain could improve the WHA and transparency of the 13S globulin gel. AS

Soybeans

2445

Mishra (HN) and Mukherjee (RK). **Effect of temperature and surface area on drying of dehulled and water-blanching soybeans.** *Journal of Food Science and Technology (India)* 29(5): 1992; 318-319

Surface area of the blanching soybean (BS) splits (*dhals*) increased two folds by flaking, thereby reducing the drying time by half. Mechanical drying (MD) was found to be better than sun-drying. The rate of drying seemed to increase with temp. MD at 60°C for 4 h for unflaked sample and for 2 h for flaked sample were found suitable for the drying of dehulled and BS for milling. AS

Soy flour

2446

Pallavi Sharma, Chauhan (GS), Pratima Awasthi and Usha (MS). **Texture profile and consumer acceptability of defatted soy flour substituted traditional foods.** *Journal of Food Science and Technology (India)* 29(5): 1992; 322-323

The substitution of chickpea flour with defatted soyflour (DSF) at 25% level did not significantly alter breaking strength of *Murukku*, (snack) but had a significant effect on the breaking strength of *Nankhatal*. Bulk density of DSF-substituted *Mysore Pak* (sweet preparation) was higher than the bulk density of *Mysore Pak* prepared from chickpea flour. Consumer acceptance tests showed that the products were well accepted. AS

Soy products

2447

Funk (MA) and Baker (DH). **Effect of soy products on methotrexate toxicity in rats.** *Journal of Nutrition* 121(10): 1991; 1684-1692

Several exp. were conducted to determine the effect of various soy products on methotrexate (MTX) toxicity. Products tested included soybean meal, soybean concentrate, soybean isolate and soybean fiber, which were provided as replacements for casein or corn starch in a semi-purified diet. Soybean meal and soybean concentrate offered the greatest protection, completely alleviating MTX-induced anorexia and diarrhea when included as the sole protein source and fed 14 days prior to and 7 days following intraperitoneal MTX injection at 20 mg/kg body wt. Positive responses also were observed with soybean isolate and soybean fiber. Histological examination of the small intestine of MTX-injected animals revealed that soybean concentrate and soybean isolate prevented the necrosis observed in animals fed the casein-based semi-purified diet. Methotrexate levels in plasma were similar for animals fed semi-purified diets in which protein was supplied by casein, soybean concentrate or soybean isolate. Thus, altered plasma MTX levels did not explain the differences among protein sources in ameliorating MTX-induced anorexia and gut toxicity. White blood cell counts were depressed by MTX in animals fed all diets. AS

Paneer

2448

Anjali Jain and Mital (BK). **Quality characteristics of paneer prepared from different varieties of**

soybean. *Journal of Food Science and Technology (India)* 29(5); 1992; 298-300

Eight soybean var. were used to study the quality characteristics of *soy paneer*. The protein content of the var. was significantly correlated with protein content of soy milk ($r = +0.92$) and *soy paneer* ($r = +0.76$), respectively. However, no significant correlations between (i) protein content of the bean and *paneer* yield, (ii) protein content of the bean and its % recovery in the product were observed. The moisture content of the product significantly influenced its porosity ($r = +0.96$) and shear strength ($r = -0.99$). Deep-fat-frying (180 C for 8 min) substantially reduced moisture content of the product and enhanced its fat content. On sensory qualities, *paneer* prepared from 'Pb-1' var. was superior to *paneer* prepared from other varieties. AS

Soy milk

2449

Nsofor (LM) and Anyanwu (KB). **Development and evaluation of concentrated soy milk beverage.** *Journal of Food Science and Technology (India)* 29(5); 1992; 331-332

A concentrated soy milk beverage of 32% total solids content was developed using soybean extract, palm kernel oil, sucrose, *trona* extract (a local emulsifier and tenderizer) and water. Sensory evaluation of the beverage in a preference test showed consumer acceptance of the beverage in contrast to the preference for the evaporated milk var. Male panelists scored significantly ($\alpha = 0.05$) higher overall mean acceptance scores for the milk products and soy beverage than females. Development of a low cost soy-based evaporated cow milk analogue thus may be feasible. AS

Soy-yoghurts

2450

Nsofor (LM) and Chukwu (EU). **Sensory evaluation of soy milk-based yoghurt.** *Journal of Food Science and Technology (India)* 29(5); 1992; 301-303

Soy yoghurt (SY) with improved sensory characteristics was prepared from a base that consisted of 22% soybean solids, 4% sucrose, 2% corn starch, 0.3% sodium citrate, water and fermented with 5% active mixed starter culture (*Lactobacillus bulgaricus* and *Streptococcus thermophilus*). Comparative sensory evaluation of cow milk yoghurt and improved SY produced 9 point mean Hedonic scores of 6.2 and 5.9 for overall acceptability which were insignificantly different (α

= 0.01). 73% of the respondents rejected SY as an alternative to cow milk-based yoghurt. AS

TUBERS AND VEGETABLES

Cassava

2451

Badrie (N) and Mellowes (WA). **Cassava starch or amylose effects on characteristics of cassava (*Manihot esculenta* Crantz) extrudate.** *Journal of Food Science* 57(1); 1992; 103-107

Blends of cassava flour (CF) with cassava starch (CS) or amylose were processed on a Wenger X-5 lab. extruder. CS added to CF increased total carbohydrate in feed, reducing yellow colour, water absorption and extrudate bulk density but increased expansion, product moisture, water solubility and total reducing sugars. Amylose addition increased extrudate surface regularity with reduced water solubility, total reducing sugars, and bulk density. Expansion was highest in mixtures containing 60% amylose. Textural properties of extrudate increased on addition of amylose or CS. Differences in microstructures existed between CF and CS extrudate. AS

2452

Okolie (NP), Ibeh (IN) and Ugochukwu (EN). **Production of improved cassava fufu, 'akpu', through controlled fermentation.** *Food Chemistry* 44(2); 1992; 137-139

Controlled fermentation of cassava tuber using starter culture consisting of *Citrobacter freundii*, *Geotrichum* spp., *Candida* spp. and *Saccharomyces* spp. yielded the most acceptable product 'akpu' with respect to odour and residual cyanide ($P < 0.05$; $P < 0.01$) in some cases). 'Akpu' from traditional fermentation has significantly higher protein ($P < 0.01$) and lowest HCN than the product of controlled fermentation; but the product was not acceptable due to its odourous property. BV

Cassava flour

2453

Badrie (N) and Mellowes (WA). **Soybean flour/oil and wheat bran effects on characteristics of cassava (*Manihot esculenta* Crantz) flour extrudate.** *Journal of Food Science* 57(1); 1992; 108-111

Adding 25% soybean flour (SF) to cassava flour (CF) increased crude protein % from 1.38 plus or minus

0.02 to 14.98 plus or minus 0.06. The addition of 12% wheat bran to CF, the % crude fiber increased from 1.68 plus or minus 0.02 to 3.38 plus or minus 0.03. Differences in the % of crude protein and crude fiber between the pre-extrusion blends and extrudates at various levels were insignificant. The reducing sugars in 100% CF increased from 2.1 plus or minus 0.10 (preextrusion blend) to 21.95 plus or minus 0.20 (extrudate) on extrusion processing. The lowest water absorption and highest water solubility of extrudate were obtained on 4% addition of soybean oil. Extrudates containing 25% SF differed from 100% CF extrudates by 11.68 colour units. Extrudates appeared most yellow (3.41 y 6.50/2.44) on addition of 4% soybean oil. SRA

Potatoes

2454

Becker (R) and Gray (GM). **Evaluation of a water jet cutting system for slicing potatoes.** *Journal of Food Science* 57(1); 1992: 132-137

The parameters studied were water pressure, nozzle orifice diam., cutting speed and the resulting calculated depth of subsurface cellular damage. When samples were cut at a speed of 3.0 MPM, the least subsurface cellular damage occurred with the 0.076 mm orifice, regardless of the water pressure used. Subsurface damage increased as orifice diam. increased to 0.229 mm. Intermediate water pressures were associated with more subsurface cellular damage than the highest or lowest pressures. French fries cut with the waterjet set to cause intermediate subsurface damage had increased colour irregularities but no extreme taste or textural differences were observed compared to conventionally cut control samples. SRA

2455

Wang (N) and Brennan (JG). **Moisture sorption isotherm characteristics of potatoes at four temperatures.** *Journal of Food Engineering* 14(4); 1991: 269-287

Moisture equilibrium data of potatoes by desorption and adsorption were determined at 40, 50, 60 and 70 C. The experimental procedure was a gravimetric method. Isothermic heats of water desorption and adsorption were calculated by applying the Clausius-Clapeyron equation to the sorption isotherms at different temp. Seven mathematical models were used to fit the experimental data. A nonlinear least-squares regression program was used to evaluate the constants of the seven desorption and adsorption isotherm models. AS

2456

Gekas (V) and Lamberg (I). **Determination of diffusion coefficients in volume-changing systems - Application in the case of potato drying.** *Journal of Food Engineering* 14(4); 1991: 317-326

This work was based on a modified Crank approach in order to determine the diffusion coeff. in systems where volume changes occur during drying. The modified model was applied to the case of potato drying, for both raw and blanched potatoes, at two temp.: 60 and 80 C. The degree of volume change (shrinkage) was different for raw and blanched potatoes, but only small differences have been observed for the diffusion coeff. of reference, which was evaluated at $2.25 \text{ (plus or minus } 0.13) \times 10^{-10} \text{ m}^2/\text{s}$ for raw potatoes and $2.48 \text{ (plus or minus } 0.28) \times 10^{-10} \text{ m}^2/\text{s}$ for blanched potatoes. AS

2457

Temple (VJ), Ojobe (TO) and Onobun (CE). **Chemical composition of Livingstone potato tubers (*Plectranthus esculentus*).** *Journal of the Science of Food and Agriculture* 56(2); 1991: 215-217

Chemical analysis of Livingstone potato tubers show crude protein, crude lipid and total carbohydrate values of 63.5 g kg^{-1} , 26.3 g kg^{-1} and 854.0 g kg^{-1} DM respectively. The trace element content of the tubers was Fe 25.6 mg kg^{-1} , Cu 5.0 mg kg^{-1} , Pb 0.39 mg kg^{-1} and Zn 10.0 mg kg^{-1} DM. The levels of threonine (4.48 g per 16 g N) and phenylalanine (3.34 g/16 g N) in the tubers are higher than the FAO reference values from 1970. AS

2458

Pizzoferrato (L). **Examples of direct and indirect effects of technological treatments on ascorbic acid, folate and thiamine.** *Food Chemistry* 44(1); 1992: 49-52

From the effects of sulphiting agents in thiamine and folic acid levels in treated potatoes and that of industrial pasteurization on ascorbic acid content of cow's milk, an interesting double effect of processing - 'direct' against vitamin stability and 'indirect' against natural vitamin antagonists is suggested leading to the hypothesis that in processed foods the residual levels of vitamins should depend on the equilibrium between the effects. SD

Sweet potatoes

2459

Walter (WWJr), Fleming (HP) and McFeeters (RF). **Firmness control of sweet potato French fry-type product by tissue acidification.** *Journal of Food Science* 57(1); 1992: 138-142

The softening of French fry-type product prepared from 'Jewel' sweet potatoes decreased when the tissue pH was lowered from Ca 6 to 3.8 prior to blanching. When ionic strength of the acidulant sol. was increased to 0.3 or more with NaCl, firmness retention was lowered. This process could possibly be used as a means to control textural properties of other types of sweet potato products. SRA

Sweet potato starch

2460

Kohyama (K) and Nishinari (K). **Cellulose derivatives effects on gelatinization and retrogradation of sweet potato starch.** *Journal of Food Science* 57(1); 1992: 128-131, 137

Effects of physically or chemically modified celluloses on gelatinization and retrogradation of sweet potato starch were examined by rheological measurements and differential scanning calorimetry. The mixture of sweet potato starch and 4 modified celluloses (powdered microcrystalline cellulose, alkaline soluble fibrous cellulose, carboxymethylcellulose and methylcellulose) in the ratio of 9 to 1 was used as a model, because that ratio of starch to cellulose is about the same for sweet potato root. Cellulose derivatives generally did not show important effects on gelatinization temp. and enthalpy of gelatinization. Cellulose derivatives which are not water-soluble increased starch retrogradation, while water-soluble methylcellulose unexpectedly prevented retrogradation. AS

Vegetables

2461

Gnanasekharan (V), Shewfelt (RL) and Chinnan (MS). **Detection of colour changes in green vegetables.** *Journal of Food Science* 57(1); 1991: 149-154

The sensitivity of colorimetry and sensory evaluation for detn. of postharvest colour changes in broccoli (B), cucumber (C), spinach (S) and tomato (T) was studied at normal (10 C for C and T, 4 C for B and S) and abuse (37 C for C and T, 21 C for B and S) temp. Both techniques resolved major colour changes but failed to detect changes under normal storage temp. With significant colour changes, both methods exhibited similar patterns. The sensitivity of detection of colour changes in green vegetables should be determined before measuring such changes during storage. AS

2462

Dikshith (TSS), Mishra (VK), Joshi (DD), Srivastava (MK) and Raizada (RB). **Organochlorine insecticide residues in vegetables of Lucknow market in India.** *Journal of Food Science and Technology (India)* 29(5); 1992: 335-337

Vegetables collected from Lucknow were found contaminated with organochlorine insecticides (OI) such as HCH, DDT, aldrin and endosulfan. Among these, the concn. of HCH was highest (0.0638 - 0.4908 p.p.m.) followed by DDT (0.0012 - 0.1068 p.p.m.) and aldrin (0.0012 - 0.0486 p.p.m.). Trace amounts of endosulfan ranging from 0.00005 - 0.0009 p.p.m. were present in all the vegetables. The residue levels of OI in different vegetables analysed were below the max. permitted residue limits. AS

2463

Komaitis (ME), Ifanti-Papatragianni (N) and Passaloglou-Emmanoulidou (S). **Chlorophyll and pheophytin changes in some frozen vegetables during storage.** *Grasas y Aceites* 41(4-5); 1990: 371-373

The chlorophyll and pheophytin contents of frozen samples of okra and green beans were measured according to the method of Vernon. The effect of time and temp. of storage was also studied. The chlorophyll loss was considerable for samples stored at -5 C for 3 months. At -11 and -18 C the chlorophyll was retained for longer periods of time (up to 6 months), while at -30 C the chlorophyll loss was insignificant. Samples stored at -30 C kept their colour even after 7 months of storage. Intermediate temp. (-18 to -30 C) seems to offer a good alternative for the storage of okra and green beans. AS

Cucumbers

2464

Rodrigo (M), Lazaro (MJ), Garcia (G), Conesa (F) and Safon (J). **Pilot study of cucumber fermentation: Diffusing gases and bloater damage.** *Journal of Food Science* 57(1); 1992: 155-160

A pilot study was made of the effect of temp. (17 and 26 C) and purging, with N (5 - 20 L/h applied continuously and intermittently) or air (20 L/h for 7 h/day), on the development of fermentation and on the incidence of bloater damage in cucumbers. Temp. affected the rate of fermentation and both temp. and purging strongly affected the incidence of bloater damage. At 17 C purging was not necessary, and at 26 C 10 L/h was sufficient, applied for 7 h/day for 7 days. AS

Tomatoes

2465

Hawladar (MNA), Uddin (MS), Ho (JC) and Teng (ABW). **Drying characteristics of tomatoes.** *Journal of Food Engineering* 14(4); 1991: 259-268

In this investigation, the drying characteristics of tomatoes have been studied under various operating conditions. A drier was built for exp. under controlled conditions. Exp. were conducted with different air temp. and flow velocities to determine the drying characteristics of tomato. A diffusion model was used to study the drying of sliced tomato specimens. Shrinkage was observed and this effect was taken into account in the basic diffusion model through the use of a power law expression that related apparent shrinkage to moisture content. Analysis of experimental data yielded correlations between the effective diffusivity and both temp. and air velocity. An equation was also developed to estimate the drying time to reach a particular moisture level. AS

Tomato paste

2466

Aziz (NH), Farag (S) and Hassanin (MA). **Effect of gamma irradiation and water activity on mycotoxin production of alternaria in tomato paste and juice.** *Die Nahrung* 35(4); 1991: 359-362

γ -irradiation (4 kGy level) of tomato paste and juice significantly or completely inhibited the production of tenuazonic acid (TZA) by *Alternaria alternata*. Only trace amount of TZA was detected at 0.98 a_w (1.50 $\mu\text{g/g}$) by 3 kGy-irradiated conidia in tomato paste, while it was inhibited completely in juice. Increasing γ -irradiation doses and decreasing a_w decreased greatly or inhibited TZA production in both tomato paste and juice. BV

FRUITS

2467

Voldrich (M) and Kyzlink (V). **Cyanogenesis in canned stone fruits.** *Journal of Food Science* 57(1); 1992: 161-162, 189

Glycoside contents were determined in seeds and pulp of several sp. and cvs of fresh fruits. Highest amounts were found in morello cherries, and lowest in some cvs of apricots. Cvs with a higher concn. of glycosides in seeds usually also contained higher amounts in pulp. The most important factors affecting the hydrogen cyanide (HCN) content in the edible portion of canned stone fruits were glycoside

content in raw fruits and the course of heat treatment. Enzymatic hydrolysis of glycoside during heat processing is the major source of the evolved HCN. Fruits with low glycoside content should be chosen for processing without stoning. If necessary to process unstoned fruit with higher glycoside content, HTST treatment should be used. SRA

2468

Sahbaz (F) and Somer (G). **Determination of ascorbic acid in fruit and vegetable using normal polarography.** *Food Chemistry* 44(2); 1992: 141-146

A method is presented in which ascorbic acid can be determined easily by the polarographic technique. The principal advantages with this method are its specificity, comparative rapidity and applicability to highly coloured sol. It is also straightforward with easy sample preparation steps, low reagent consumption and time saving. In addition it does not require expensive instrumentation. Thus these features make it suitable for analysis of vitamin C in fruits and vegetables. BV

2469

Anon. **Net isosteric heat of sorption in dried fruits.** *Journal of Food Engineering* 14(4); 1991: 327-335

In this work, the net isosteric heats of sorption ($q_{st,n}$) of 5 dried fruits (Sultana raisins, currants, figs, prunes and apricots) were determined for adsorption and desorption, using the relevant thermodynamic relation, (i.e. Clausius-Clapeyron equation) in the temp. range 15-60 C, based on the experimental sorption data. From the results, several mechanisms are proposed for the sorption of water in dried fruits with high sugar content. The high value of $q_{st,n}$ in the initial stages of adsorption, and its steep decrease in the moisture content range 4-8% dry basis, suggest a monomolecular physical sorption on highly active polar sites. In the moisture content range 10-25%, the sorption occurs in multilayers on less active sites, and there is a slight dissolution of sugars in the water. In the range 25-40% dry basis, there is an increased dissolution of sugars and a weaker sorption on active sites. Finally, at moisture contents above 40%, complete dissolution and extrusion of sugars and the plasticization of biopolymers takes place. AS

Grapefruits

2470

Ericson (AP), Matthews (RF), Teixeira (AA) and Moya (HA). **Recovery of grapefruit oil constituents from processing waste water using**

styrene-divinylbenzene resins. *Journal of Food Science* 57(1); 1992; 186-189

Styrene-divinylbenzene (SDVB) resins were utilized for the recovery of coldpressed grapefruit oil constituents from model sol. and waste waters. Sorption rates and sorption capacities were determined for a series of resins with model sol. Citrus oil processing waste water was passed through an upflow column extraction system. Adsorbed oil was desorbed using 95% ethanol and GC analysis was performed to determine the quality of the extracted oil. The waste water samples contained suspended solids which reduced the extraction ability of the resins. Major compounds recovered from waste waters were d-limonene and α -terpineol. Nootkatone and linalool recovery levels varied, while octanol and decanal were present in extremely low levels in the recovered products. AS

Grapes

2471

Gonzalez-SanJose (ML) and Diez (C). **Relationship between anthocyanins and sugars during the ripening of grape berries.** *Food Chemistry* 43(3); 1992; 193-197

The sugars in the must of 2 var. of red grapes showed direct relationship to the total anthocyanins and to the derivatives of peonidin. The sugars in the skin showed close relationship with the anthocyanins and to other phenolic compounds. SD

Mangoes

2472

Pradnya Kanekar, Seema Sarnaik and Neeta Joshi. **Sugar and acid tolerant microorganisms causing spoilage in mango jam (Muramba).** *Journal of Food Science and Technology (India)* 29(5); 1992; 278-280

Microorganisms isolated from home made mango jam (muramba) samples belonged to 11 bacterial and 2 fungal species. Physiological studies of the isolate with respect to tolerance to sucrose and citric acid incorporated in synthetic medium showed growth at 78% sucrose and 24.5% citric acid by *Aspergillus niger* followed by *Penicillium* sp. (66% sucrose and 18% citric acid), *Bacillus laterosporus* and *Staphylococcus saprophyticus* (70% sucrose and 24.5% citric acid respectively). This forms the first report of these sp. for sugar tolerance. When artificially inoculated, *Asp. niger* and *Penicillium* sp. caused spoilage in muramba samples with 60% sugar and boiled for 30 and 40 min but not in samples with 70 and 80% sugar and boiled for 30 min. AS

2473

Ramteke (RS), Dhanaraj (JS) and Eipeson (WE). **Sensory quality studies on mango aroma concentrate during storage.** *Journal of Sensory Studies* 6(3); 1991; 193-203

The aroma stripped 'Alphanso' and 'Totapuri' mango pulp concentrates were canned as such and after mixing with 50% aroma concentrates and stored at 25 plus or minus 5 C. Aroma concentrates were bottled and stored at 2 C. At different intervals of 6 months storage, beverages were prepared and evaluated upto 30 days storage. Beverages prepared from mango concentrates to which 50% aroma was added before canning was superior to those prepared from aroma stripped canned pulp concentrate to which aroma was added at the time of beverage preparation. SD

2474

Joseph (K) and Aworh (OC). **Post-harvest treatment of wild mango (*Irvingia gabonensis*) for improved shelf-life.** *Food Chemistry* 44(1); 1992; 45-48

Dipping wild mangoes in hot (55 C) water or hot 0.1% benomyl, 0.5% sodium dehydroacetate or 0.5% Na₂S₂O₅ followed by waxing or packaging in boxes overwrapped with starch PVC film, delayed ripening, controlled decay, minimised wt. loss and extended the shelf-life of the fruits stored at 22 - 35 C and 70 - 95% RH without adversely affecting visual and chemical qualities. PVC film packaging preceded by a sulphite dip yielded best results. SD

Peaches

2475

Javeri (H) and Wicker (L). **Partial purification and characterization of peach pectinesterase.** *Journal of Food Biochemistry* 15(4); 1991; 241-252

Pectinesterase (EC 3.1.1.11) was extracted from peaches (*Prunus persica*) and partially purified by preparative free sol. isoelectric focusing. On SDS-PAGE gels, protein bands at 36.3 and 33.9 kilodaltons represented the major bands; minor bands were observed at 108.4, 40.7 and 17.0 kilodaltons. The pH optimum for pectinesterase activity in the partially purified extract was 8.0. The enzyme was stable at 30 C for 30 min between pH values of 5 and 8. Peach pectinesterase is stable when heated at 55 C for 5 min in 0.1 M NaCl, 50 mM sodium phosphate, pH 7, buffer. However, residual activity decreased to 23% at 65 C for 5 min and was inactivated at 70 C for 5 min. The energy of activation of peach pectinesterase was determined

to be 34,600 J/mol^oK. The Q_{10} between 30 C and 60 C was estimated to be 1.5 - 1.6. AS

Pears

2476

Sinobas (LR), Ruiz-Altisent (M) and Jose Luis de la Plaza Perez. **Bruise development and fruit response of pear (cv. 'Blanquilla') under impact conditions.** *Journal of Food Engineering* 14(4): 1991: 289-301

Pear fruits cv. 'Blanquilla', at various ripening stages, were studied under impact conditions. A 50.6-g spherical steel indentator, with a radius of curvature of 0.94 cm, was dropped on to the fruit from 3 heights: 4, 6 and 10 cm (0.0199, 0.0299 and 0.0499 J). The variables measured were analyzed. All variables were observed to be related to the impact energy - except impact duration, which was related to the fruit firmness. Bruising correlated with impact energy when considering different heights, but not with any specific variable when studying the impact phenomenon at individual heights; however, there was a clear correlation between impact bruising and firmness. Three bruise shapes were observed, corresponding to preclimacteric, climacteric and postclimacteric fruits; a theory for this response is offered. According to the results, the impact response in postclimacteric pear fruits (with firmness values of less than 25 N, and a maturity index above 55) may be explained by the role played by the skin rather than by the pulp. AS

Pomegranates

Anardana

2477

Mahajan (BVC), Chopra (SK) and Sharma (RC). **Processing of wild pomegranate (*Punica granatum* L.) for Anardana: Effect of thermal treatments and drying modes on quality.** *Journal of Food Science and Technology (India)* 29(5): 1992: 327-328

Comparison of deep hot sand roasting of whole fruit, dry roasting on heater and blanching in boiling water for 5 min to remove fleshy seeds from wild pomegranate fruits indicated best results with the first method. The quality of the dried seeds was far superior when dried in solar drier as compared to conventional sun-drying or hot-air drying. AS

Strawberries

2478

Skrede (G), Wrolstad (RE), Lea (P) and Enersen (G). **Colour stability of strawberry and blackcurrant syrups.** *Journal of Food Science* 57(1): 1992: 172-176

Strawberry syrup (SS) plain and fortified with anthocyanins and/or ascorbic acid levels equivalent to those of blackcurrent syrup (BS) were compared for colour stability (CS). Anthocyanin pigments of unfortified strawberry syrup were less stable than those of BS. CS of SS fortified with equal anthocyanin concn. was similar to BS. Hence, CS was dependent upon total anthocyanin concn. rather than qualitative pigment composition. Ascorbic acid fortification decreased colour stability in SS whereas anthocyanin pigment fortification showed slight protective effect on ascorbic acid. SRA

2479

Carbonell (E), Costell (E) and Duran (L). **Rheological indices of fruit content in jams: Influence of formulation on time-dependent flow of sheared strawberry and peach jams.** *Journal of Texture Studies* 22(4): 1991: 457-471

Twenty three samples of each strawberry and peach fruit jam were prepared according to a second order composite rotatable design. Weltmann A values depended on fruit content and its interaction with soluble solids and added pectin. Weltmann B values depended on the 3 variables and on pectin interaction for strawberry jams while for peach jam B values on soluble solids. Predictive power of time dependent parameters for estimation of fruit content in conjunction with soluble solids and total pectin values explained 91.7% of the variability of strawberry and 83.7% in peach jams. SD

CONFECTIONERY, STARCH AND SUGAR

Confectionery

Chocolates

2480

Franke (K) and Tscheuschner (H-D). **Modelling of the continuous high shear rate conching process for chocolate.** *Journal of Food Engineering* 14(2): 1991: 103-115

An extensive analytically deduced model for energy processes is presented for the structural modification of chocolate mass during continuous conching. The transport behaviour of chocolate mass in the conching equipment in the axial direction is described by a suitable differential

equation taking into account axial mixing of the chocolate mass. For modelling of structural modification, the required power of the shearing elements dissipated in the chocolate mass, and energy required for structural modification of the chocolate mass is used. The process model obtained describes the axial temp. distribution of chocolate mass in the conching equipment. By means of the model, the energy required to modify the structure of the chocolate mass during continuous conching is determined. AS

Sweets

Gurdani

2481

Saxena (AK), Kulkarni (SG), Berry (SK), Sehgal (RC) and Beerh (OP). **Gurdani - An Indian traditional sweet: Optimum recipe for its preparation.** *Journal of Food Science and Technology (India)* 29(5): 1992: 273-275

Gurdani - an Indian traditional sweet is prepared from Bengalgram flour (besan), deep-fat-fried in the form of *sewan* and subsequently coated uniformly with jaggery (gur). Optimum conditions and recipe for the preparation of *gurdani* have been standardized. *Gurdani* is cylindrical in shape (length 11 - 66 mm, diam. 10 - 11 mm) with unit wt. ranging from 2.2 to 5.0 g. The product had attractive yellowish brown colour, soft and crisp texture, pleasant aroma and good taste peculiar to *gurdani*. The product could be stored for 3 months without losing its quality in 200 gauge LDPE, 120 gauge PP, 100 gauge HDPE and friction-top-tins. The product, however, registered a gradual loss in moisture and a marginal rise in free fatty acid and peroxide value during the storage period. AS

Honey

2482

Vinas (P), Campillo (N), Cordoba (MH) and Candela (ME). **Simultaneous liquid chromatographic analysis of 5-(hydroxymethyl)-2-furaldehyde and methyl anthranilate in honey.** *Food Chemistry* 44(1): 1992: 67-72

The proposed method is reverse-phase gradient-elution HPLC which can be applied for routine characterization of honey based on the methyl anthranilate content and the quality control based on 5-(hydroxymethyl)-2-furaldehyde level to evidence improper processing and storage or adulteration by invert syrup. SD

Starches

2483

Chang (Y-H) and Lii (C-Y). **Preparation of starch phosphates by extrusion.** *Journal of Food Science* 57(1): 1992: 203-205

Physicochemical properties were compared on starch phosphates (SP) of cassava and corn, prepared by an extrusion process (EP) and by the conventional method (CM), as well as their native starches. Results indicated that SP prepared by EP using 4g reagent/100g starch had only slightly lower degree of substitution values than those prepared by CM using 12.6g/100g starch (db.). The SP showed similar responses to heat treatment and pH changes. The SP made by EP had lower gelatinization temp., lower enthalpies and lower paste viscosities than those prepared by CM. SRA

Sugars

2484

Sims (KA) and Cheryan (M). **Continuous production of glucose syrup in an ultrafiltration reactor.** *Journal of Food Science* 57(1): 1992: 163-166

An ultrafiltration reactor was developed for the continuous saccharification of liquefied corn starch using glucoamylase. At an enzyme concn. of 1 g/l and a substrate concn. of 300 g/l, maltose and maltotriose were still detected in the reactor permeate after 4 hr of operation. At higher enzyme concn. (6 and 12 g/l), the reactor achieved steady-state operation within 1 -3 h at all substrate concn. studied. At an enzyme concn. of 12 g/l, residence time did not affect the final conversion of liquefied starch to glucose. The ultrafiltration reactor produced glucose syrups at residence times of 2 - 3 h and substrate concn. up to 30% w/v. AS

2485

Ananth Narayan (K) and Cross (ME). **Temperature influence on acetyllysine interaction with glucose in model systems due to Maillard reaction.** *Journal of Food Science* 57(1): 1992: 206-212

The interaction between N- α -acetyllysine and glucose was investigated in a dry cellulose matrix (1.8% moisture) at 40, 50 and 60 C and a_w 0.19 - 0.21. The loss in acetyllysine in 6 days at those temp. was 22, 54 and 79%, respectively. The degradation data more clearly fit double exponential function ($Ae^{Bx} + Ce^{Dx}$) than the first order function, Ae^{Bx} . An estimate of the activation energy of 36 kcal/mol and a Q_{10} of 5.5 was computed from second order rate constants for acetyllysine and

glucose degradation. The increase in colour followed zero order kinetics and indicated an activation energy of 44 kcal/mol for the presumed third phase of the Maillard reaction in the solid state. AS

2486

Dailliant (B) and Issanchou (S). **Most preferred level of sugar: Rapid measure and consumption test.** *Journal of Sensory Studies* 6(3): 1991: 131-144

Yoghurt samples with 13 levels of added sugar from 1.83 - 25.1 g/100 g (concn. ratio about 4:3) were evaluated by 24 consumers in 13 lab. meals on an ideal relative-rating and a consumption test. The consumption test showed that the behaviour of the 30% of subjects could not be related to the sugar level. The most preferred level of sugar obtained with the ideal relative rating was not always the most consumed. The ideal relative rating predict better the consumption behaviour. SD

BAKERY PRODUCTS

Bread

2487

Snider (M) and Leibman (M). **Calcium additives and sprouted wheat effects on phytate hydrolysis in whole wheat bread.** *Journal of Food Science* 57(1): 1992: 118-120

Whole wheat bread loaves were subjected to treatments of different fermentation periods, different sources and levels of Ca, and the addition of sprouted wheat. A 2 h leavening period produced a significantly greater mean loss in phytate than by 1 h leavening period. Nonfat dry milk caused the most significant inhibition of phytate hydrolysis among the loaf sets. The magnitude of inhibition was CaCl_2 , followed by yoghurt and CaCO_3 , respectively. Phytase activity increased during seed germination and sprouted wheat contained 24% less phytate than the 100% extracted whole wheat flour. Thus addition of sprouted wheat decreased absolute phytate losses. Comparison of phytate losses in yeasted vs non-yeasted loaves suggested that endogenous wheat phytase was quantitatively more important than yeast phytase during bread making. SRA

2488

Indrani (D) and Venkateswara Rao (G). **Effect of processing methods on the quality of whole wheat flour bread.** *Journal of Food Science and Technology (India)* 29(5): 1992: 293-295

Whole wheat flour breads based on straight dough, sponge and dough and mechanical dough development methods were prepared. The specific loaf vol. of bread from sponge and dough method was highest (2.44 cc/g) followed by the straight dough method (2.31 cc/g) and mechanical dough method (2.13 cc/g). The effect of different methods on the crumb texture of bread was distinct. The crumb texture was very soft, soft and slightly hard for breads by sponge and dough, straight dough and mechanical dough development methods, respectively. The results indicated that sponge and dough method was better suited than straight dough and mechanical dough development methods. However, the breads from different methods possessed wholesome typical wheaty taste. AS

Snacks

2489

Almeida-Dominguez (NG), Higuera-Clapara (I), Goycoolea (FM) and Valencia (ME). **Package, temperature and TBHQ effects on oxidative deterioration of corn-based snacks.** *Journal of Food Science* 57(1): 1992: 112-117

A highly-nutritive corn-soybean-chickpea fried snack (CSCS) was packaged in LDPE and HDPE bags, and a commercial corn snack (CCS) was packaged in LDPE bags. Accelerated shelf-life test methodology was employed to study products stored at 50% RH and at 40 and 50 C. The CSCS was fried in oil containing 0.01% TBHQ antioxidants. The products had moisture absorption but did not significantly affect sensory acceptability throughout storage. The formulated snacks had a similar pattern to that of CCS with respect to chemical and sensory deterioration, but the rate of quality loss was higher in CCS. HDPE provided better protection against moisture absorption than LDPE at 40 C but the difference was negligible at 50 C. Addition of TBHQ antioxidant prolonged shelf-life regardless of film used. The use of HDPE over LDPE resulted in significantly longer shelf-life and lowest cost/day extension at ambient temp. SRA

2490

van Laarhoven (GJM) and Staal (G). **Rheology of the paste from gelatinization by extrusion during the production of third-generation snacks.** *Journal of Food Engineering* 14(1): 1991: 53-70

In an extrusion process for snacks the influence of different raw material properties and processing conditions on the viscosity of the paste and on the final snack quality was studied. Potato granules and flakes, mixed with potato starch and water, were processed in the gelatinization part of an extruder. The paste leaving this part was placed in a back

extrusion cell and the force (BEF) required to press the paste was measured. The viscosity was calculated for different shear rates using the best suited model, the power law model. The influence of raw material properties on BEF was small but moisture content and temp. had great influence on BEF and viscosity. The relations are presented in model equations. In the forming part of the extruder the paste was pressed into a pellet. After expansion by frying the final snack was evaluated by a sensory panel. Some sensory properties of the snacks are related to BEF and to process conditions. AS

Tortillas

2491

Holt (SD), Resurreccion (AVA) and McWatters (KH). **Formulation, evaluation and optimization of tortillas containing wheat, cowpea and peanut flours using mixture response surface methodology.** *Journal of Food Science* 57(1): 1992; 121-127

Tortillas prepared with different composite blends of wheat, cowpea and peanut flours were evaluated by mixture response surface methodology. Results showed that substitution of wheat flour with upto 24% cowpea and 46% defatted peanut flours resulted tortillas with quality characteristics similar to those from 100% wheat. Sensory evaluation indicated that beany flavour was the most limiting attribute. Sensory attributes correlated significantly with physical and compositional measures of tortillas and physical measures of tortilla dough. SRA

MILK AND DAIRY PRODUCTS

Milk

2492

Woychik (JH), Cooke (P) and Lu (D). **Microporous ultrafiltration of skim milk.** *Journal of Food Science* 57(1): 1992; 46-48, 58

Membranes with porosities of 100 and 200 nm, were used to obtain a 4:1 milk volume reduction. Average micelle diam. determined from electron micrographs were 46 nm (permeate) and 52 nm (permeate) for the 100-nm-pore fractions and 46 and 55 nm for the 200-nm-pore fractions. The calculated average micellar volumes of the retentate fractions were about twice those of the corresponding permeate fractions. Casein-whey ratios were 0.7 - 0.9 in the permeates and 5.0 - 7.7 in the retentates. Higher α_{s2} - and lower β -casein contents were found in the permeate micelles than in the retentates. AS

2493

Xu (SY), Stanley (DW), Goff (HD), Davidson (VJ) and Le Maguer (M). **Hydrocolloid/milk gel formation and properties.** *Journal of Food Science* 57(1): 1992; 96-102

Three rheological measurements, as well as cryo-scanning electron microscopy, were used to study the mechanism of gel formation and structure of a hydrocolloid-based milk gel. Processing conditions included combinations of pH level and total solids concn. as well as fat content. The first two variables and their interaction influenced gel point, gel strength, viscoelasticity and syneresis; while fat served primarily as a filler of the gel matrix, it also influenced those properties. In model studies of carrageenan and kappa-casein, calcium ions promoted gelation. Gel microstructure was dictated by processing variables and governed physical properties. The cold-setting mechanism occurred in three stages, hypothesized to include increased viscosity and mol. alignment, mol. interaction, and aggregation. AS

2494

Mishra (AK) and Kuila (RK). **Growth response of bifidobacterium in semi + synthetic and milk based media.** *Indian Journal of Dairy Science* 44(3): 1991; 226-231

Optimal growth of 7 strains of *Bifidobacterium bifidum* were studied in various media (Yoshioka medium, Tomarelli medium, fortified Tomarelli medium, modified MRS broth, A2 medium, cow milk and buffalo milk with 2% modified MRS broth, cow and buffalo milk with 2% pepsin digested milk and Kesikowa medium). All the media tried were equally good for growth of *B. bifidum*. Cow milk with 20% pepsin digested milk was the best suited for their growth as it gave the highest mean values of 7.51 log counts/ml, optimum growth *B. bifidum* was obtained at pH 7.2 in a liquid medium heated for 15 min prior to inoculation, at an incubation temp. of 37 C in 48 h. SRA

2495

Lin (T-C), Chen (I-J) and Ko (Y-C). **The mechanism of determining the adulteration of whole milk with milk powder by spectrophotometry.** *Die Nahrung* 35(4): 1991; 351-358

The spectrophotometric method for detn. of the reconstituted milk adulteration in the raw milk has been suggested by empirical exp. However, the mechanism is unclear. In this study it was found that the mechanism is the turbidity difference between homogenized milk and non-homogenized milk. The equation of turbidance $S = KBC(d^3/d^4 +$

λ^4) is offered as an explanation of this observation. There are linear relationships between transmittance (T[%]) and the amount of there constituted milk added ($r = 0.99$) to the raw milk, non-homogenized milk, and homogenized milk. This method is recommended for detecting the addition of reconstituted milk to raw or non-homogenized milk. The result of the empirical methods showed that the detection rate of adulteration can be as accurate as 2.5%, but this method is not recommended for detecting the adulteration of homogenized milk. AS

2496

Parris (N), Purcell (JM) and Ptashkin (SM). **Thermal denaturation of whey proteins in skim milk.** *Journal of Agricultural and Food Chemistry* 39(12): 1991: 2167-2170

Heat-induced denaturation of whey proteins, analyzed by reversed-phase HPLC, indicated that denaturation proceeds in two stages. The first stage of denaturation proceeds less rapidly than the second stage. Aggregation of whey proteins begins at about 70 C, more aggregation was found to occur in sweet whey than in acid whey. The dimer of β -LG and the β -LG- α -LA complex were found to form preferentially in heated acid whey. Comparison of the second derivative Fourier transform infrared spectra of reconstituted skim milk and high-heat non-fat dry milk (NDM) powder (85 C) showed that heat treatment results in formation of two new bands (1684 and 1613 cm^{-1}) in the amide I region at frequencies usually associated with intermolecularly hydrogen bonded β sheets. The bands were smaller in sweet whey, compared with acid whey; difference spectra indicated that β -LG was primarily responsible for the formation of heat-induced hydrogen bonding. AS

Milk powders

2497

Om Prakash, Goyal (GK) and Joginder Singh. **Physico-chemical properties of spray- and roller-dried whole milk powders made from goat milk.** *Indian Journal of Animal Science* 60(3): 1990: 369-372

The physico-chemical properties of goat whole milk powder samples obtained by spray-and roller-drying processes were compared. The bulk density, loose as well as packed, and wettability were higher for spray-dried samples, while solubility index, dispersibility and sinkability were more in roller-dried samples. The fat content, total solids content and pH value were greater for the spray-dried powder. The moisture content, titratable acidity and total reducing capacity were

higher in roller-dried powder. The method of drying significantly influenced the each studied physico-chemical property of the goat whole milk powder samples. AS

Milk products

2498

Chiralt (A), Ferragut (V) and Salazar (JA). **Rheological characterization of low-calorie milk-based salad dressings.** *Journal of Food Science* 57(1): 1992: 200-202

Oil-in-water emulsions of different quantitative composition, containing milk powder and locust bean gum as stabilizing agents, showed similar rheological behaviour: time-dependent thixotropic character and yield stress. Thixograms obtained for each sample could be modelled through the Hahn equation for the different shear rates. The analysis of the Hahn parameter variation for each sample as a function of shear rate led to a function $\sigma = f(\gamma, t)$. Predicted shear stress values had relative errors lower than 10% in 99.9% of the samples studied. Analysis of composition influence on the rheological parameters showed and interactive role of gum, milk and acetic acid concn. on emulsion consistency. AS

2499

Tewari (BD) and Sunil Sachdeva. **Development of a manufacturing technique for paneer/chhana spread.** *Indian Journal of Dairy Science* 44(3): 1991: 232-235

An acceptable bland flavoured spread based on paneer/chhana prepared from cow or buffalo milk could be standardised to contain fat: solid-not-fat ratio of 1:3. Lower temp. of coagulation resulted in a softer chhana and consequently better body and texture of the spread. The product packed in polystyrene cups has a shelf-life of about 7-10 days at 8 C. SRA.

Burfi

2500

Sharma (GK), Madhura (CV) and Arya (SS). **Studies on preparation, packaging and storage of besan (Bengalgram flour) burfi.** *Journal of Food Science and Technology (India)* 29(5): 1992: 289-292

Preparation of besan burfis (BB) and their storage behaviour in various packaging materials has been reported. BB remained acceptable for 9 and 6 months at room temp. and 37 C respectively in polyethylene and polypropylene pouches. In paper-Al foil-polyethylene pouches, the BB remained acceptable for 13 and 9 months at room

temp. and 37 C, respectively. Packaging in BHA and BHT treated polyethylene film considerably reduced the rate of peroxidation during storage due to migration of antioxidants from film to BB. Comparatively, BHT migrated faster than BHA and the rate of peroxidation was slower in samples packed in BHT treated film. The rate of storage deterioration was lowest at 0.33 a_w and both below and above this level, the rate increased considerably. AS

Butter

2501

Lee (S-R), Macku (C) and Shibamoto (T). **Isolation and identification of headspace volatiles formed in heated butter.** *Journal of Agricultural and Food Chemistry* 39(11): 1991: 1972-1975

Unsalted sweet butter was heated at 100, 150 or 200 C for 5 h. The headspace volatiles formed were collected during heating using a simultaneous purging and solvent extraction apparatus. Among 140 peaks on a gas chromatogram of the headspace sample from butter heated at 200 C, 77 were positively identified by GC and GC/MS. Major compounds identified were 21 aldehydes, 12 fatty acids, 11 ketones, 10 nitrogen- and/or S containing compounds, 7 alkanes, 6 δ -lactones, and 4 furans, which constituted over 85% of total volatiles recovered. The number of volatiles formed in a headspace of butter heated at 100 or 150 C was much less than that formed at 200 C. However, all volatiles formed at 100 and 150 C were found in a sample heated at 200 C. AS

Cheese

2502

Luna (JA) and Chavez (MS). **Mathematical model for water diffusion during brining of hard and semi-hard cheese.** *Journal of Food Science* 57(1): 1992: 55-58

The integral method, which is an approximate analytic method, was used to obtain the theoretical profile of moisture changes during brining of cheese. A mass layer was defined in the medol where all water variations take place. The model was applied at different times to semi-hard cheese brining and compared with experimental data. A moisture pseudo diffusion coeff. was obtained from experimental data as part of the proposed model. Agreement was good, which demonstrated the applicability of the model. AS

2503

Stampanoni (CR) and Noble (AC). **The influence of fat, acid and salt on the perception of selected taste and texture attributes of cheese analogs: A scalar study.** *Journal of Texture Studies* 22(4): 1991: 367-380

Twelve cheese samples with varying fat levels (10, 17.5 and 25%) NaCl (0.5 and 2%) and citric acid (0.1 and 1.2%) were evaluated by a trained panel for sourness, saltiness, springiness, firmness, cohesiveness and adhesiveness on a graphic scale and by Instron for rheological measurement. Results indicated that the increased salt content in cheese analogs increased the saltiness, sourness and decreased pH; increasing the acid or salt content decreased cohesiveness, springiness and an increase in firmness and higher fat content gave softer, less springy, more cohesive and adhesive cheese analog. SD

2504

Stampanoni (CR) and Noble (AC). **The influence of fat, acid and salt on the temporal perception of firmness, saltiness and sourness of cheese analogs.** *Journal of Texture Studies* 22(4): 1991: 381-392

A trained panel evaluated computerized time-intensity (T-I) parameters, saltiness, sourness and firmness of 8 cheese samples of varying fat (10 and 25%), NaCl (0.5 and 2%) and citric acid (0.1 and 1.2%). Instron compression and pH data were also collected. Max. intensity of saltiness and sourness were perceived when the samples were dissolved and continued to be perceived upto 65 and 50s following the breakdown of the cheese analog structure. Acid increased sourness, salt increased saltiness and sourness. Acid or salt increased firmness and decreased fat. SD

2505

Goyal (GK) and Babu (KE). **Influence of packaging and storage on the chemical quality of processed cheese.** *Indian Journal of Dairy Science* 44(4): 1991: 247-279

The processed cheese samples packaged in tin cans and stored at 30 C and 60% RH and 7.8 C and 80% RH for different time intervals showed the least chemical changes during storage under both the conditions. Samples packed in LDPE cups and polystyrene cups showed significant changes in chemical quality. BV

Chhana

2506

Goyal (GK). **Influence of packaging on the chemical quality of chhana during storage under refrigeration conditions.** *Indian Journal of Dairy Science* 44(3): 1991; 236-246

Chhana samples packaged in poster paper/Al foil/LDPE (55/60 g/m², 0.02 mm and 150 gauge)-P₁ showed min. chemical deterioration during storage followed by the samples packed in poster paper Al foil/LDPE (50/60 g/m², 0.009 mm and 150 gauge)-P₂ and MST cellulose film/LDPE (30 g/m² and 150 gauge)-P₃ respectively in descending order. The package P₁ was referred for packaging and storage of chhana at 4-5 C and 100% RH. BV

Ice cream

2507

Arora (KL) and Bhatia (KL). **Formol titration method for determining protein content in ice cream.** *Indian Journal of Animal Science* 60(10): 1990; 1252-1255

Khoa

2508

Patel (AA), Patil (GR), Garg (FC), Gupta (SK) and Rajorhia (GS). **Effect of concentration conditions on texture of Khoa.** *Journal of Food Science and Technology (India)* 29(5): 1992; 323-324

The steam kettle process A of khoa-making yielded a product that was significantly harder, springy, gummy and chewy, but less adhesive than that from the simulated traditional process B. Sensory evaluation also showed that firmness and chewiness were higher for process A. Having higher smoothness and lower crumbliness, khoa made by process B was rated appreciably more desirable from the view-point of overall textural quality. High-moisture khoa (Dhap) was softer and smoother, but less gummy and less chewy as compared to low-moisture khoa (Pindi). The interactions of process with moisture and milk acidity were statistically non-significant for all texture parameters except sensory chewiness. AS

Wheys

2509

Ker (YC) and Toledo (RT). **Influence of shear treatments on consistency and gelling properties of whey protein isolate suspensions.** *Journal of Food Science* 57(1): 1992; 82-85, 90

Suspensions of whey protein isolate (WPI) subjected to controlled shearing by capillary extrusion, and rheologically tested after shearing, showed increasing consistency index as applied shear rate increased. Sheared suspensions gelled more rapidly than unsheared ones and produced stronger gels. SEM micrographs showed the development of a fine fibrous-like structure in the sheared suspensions, indicating numerous sites of protein-protein interaction. Sheared WPI suspensions, added as a replacement for fat in frankfurter formulations, showed excellent water-holding capacity, producing low-fat frankfurters with elastic moduli in the same order of magnitude as commercial frankfurters. AS

2510

Krishnaiah (N), Reddy (CR) and Rama Rao (M). **Development of beverage from acid whey.** *Indian Journal of Dairy Science* 44(4): 1991; 300-301

Three categories of whey beverages: (i) prepared by the addition of sugar (10%) and citric acid (0.2%) to deproteinized whey; orange essence and orange colour; (ii) prepared by mixing 3 parts of acid whey with pH 6.8, one part of toned milk and sugar at 10% level and pineapple essence and yellow colour; and (iii) prepared by mixing 3 parts of acid whey with pH 6.8, one part of toned milk and sugar at 10% level and banana essence and lemon yellow colour were formulated. All the categories of whey beverages were acceptable with almost identical sensory quality. (ii) and (iii) categories of beverages were more acceptable than the (i) due to added toned milk. BV

Milk proteins

Caseins

2511

Haque (ZU) and Khalifa (MY). **k-Casein heterogeneity and mild heating effects on susceptibility to chymosin action.** *Journal of Food Science* 57(1): 1992; 49-54

Bovine SH-k-casein (k-C-pool) was fractionated into 5 components based on carbohydrate and sialic acid contents ($k\text{-C-P}_1 < k\text{-C-P}_2 < k\text{-C-P}_3 < k\text{-C-P}_4 < k\text{-C-P}_5$) by ion-exchange chromatography (DEAE-cellulose). Chymosin susceptibility observed by monitoring changes in optical density during enzyme action, varied among the components. This was a reflection of the difference in self-association of the proteins in aqueous dispersion as determined by hydrophobic interaction chromatograph. There was an inverse relationship between surface hydrophobicity of the protein polymers ($k\text{-C-P}_2 > k\text{-C-P}_3 > k\text{-C-P}_4 > k\text{-C-P}_5$

> *k*-CpP₁ > *k*-C-pool) and their susceptibility to chymosin at 37 C, pH 6.8 (*k*-C-pool > *k*-C-P₁ > *k*-C-P₄ > *k*-C-P₃ > *k*-C-P₂). Mild heating decreased susceptibility and affected flocculation of all except the highly glycosylated components *k*-C-P₄ and *k*-C-P₅ reflecting amphipathicity imparted thermostability. AS

MEAT AND POULTRY

Meat

2512

Shahidi (F) and Pegg (RB). **Nitrite-free meat curing systems: Update and review.** *Food Chemistry* 43(3); 1992; 185-191

The systems consisted of pre-formed cooked cured-meat pigment, antioxidant and/or sequesterant and antimicrobial agent and applied to comminuted and solid cuts of muscle foods. Colour, oxidative stability and flavour of the treated samples were similar to those of their nitrite-cured counterparts. SD

2513

Lind (I) and Rask (C). **Sorption isotherms of mixed minced meat, dough, and bread crust.** *Journal of Food Engineering* 14(4); 1991; 303-315

The desorption isotherms of frozen and thawed mixed minced meat were determined at 6 and 20 C, and frozen and thawed white bread dough at 6 and 30 C. The sorption behaviour of bread crust was determined during adsorption at 30 and 90 C. The *a_w* was measured on thawed mixed minced meat, minced meat, and white bread dough. The Oswin model, $X = a/a_w / (1 - a_w)^n$, was fitted to the experimental desorption isotherms of mixed minced meat and dough. The values of the constants *a* and *n* were found to be $\ln a = -0.0026T + 3.297$ and $n = 0.565$ for the mixed minced meat, and $\ln a = -0.0071T + 4.50$ and $n = 0.380$ for the dough. AS

2514

Marin (ML), Casas (C) and Sanz (B). **Estimation of the hydrophobicity modifications in meat proteins upon thermal treatment.** *Journal of the Science of Food and Agriculture* 56(2); 1991; 187-193

A fluorescent probe method using 8-anilino-1-naphthalene sulfonic acid (ANS) and all-*trans*-retinol (RET) has been used to study the effects of heat treatments on the hydrophobicity of meat proteins. The number of ANS binding sites per unit protein increased from 0.75 for unheated samples to 2.12 for meat proteins heated at 100 C

for 30 min. The number of RET binding sites increased from 0.13 to 0.46 with the same heat treatment. This is discussed in terms of % increase in aromatic (182.7%) and aliphatic (253.8%) hydrophobicity for meat proteins heated at 100 C for 30 min. On the other hand, the assay was able to discriminate between samples of meat proteins receiving heat treatments with 10 C intervals (between 40 and 100 C). AS

Beef

2515

Spanier (AM), Vercellotti (JR) and James (CJr). **Correlation of sensory, instrumental and chemical attributes of beef as influenced by meat structure and oxygen exclusion.** *Journal of Food Science* 57(1); 1992; 10-15

2516

Troutt (ES), Hunt (MC), Johnson (DE), Claus (JR), Kastner (CL), Kropf (DH). **Characteristics of low-fat ground beef containing texture-modifying ingredients.** *Journal of Food Science* 57(1); 1992; 19-24

Dietary fibers, starches and polydextrose were incorporated unhydrated into 5 and 10% fat hamburger for texture modification and comparison to 5, 10, 20 and 30% fat controls. Levels for individual and total ingredients ranged from 0.5 to 4% and 3.5 to 6%, respectively. Treatments containing polydextrose, starch and fiber had cooking losses 20-40% less than controls. Patties containing three-way combinations of ingredients were more similar to 20% fat controls for texture traits than were those containing 1 or 2 ingredients. Patties with ingredients had less oily coating of the mouth, but less juicy than controls. Beef flavour intensity scores were reduced slightly for low-fat patties with ingredients. Texture modification of low-fat ground beef is possible with food-grade ingredients. AS

2517

Troutt (ES), Hunt (MC), Johnson (DE), Claus (JR), Kastner (CL), Kropf (DH), Stroda (S). **Chemical, physical, and sensory characterization of ground beef containing 5 to 30 percent fat.** *Journal of Food Science* 57(1); 1992; 25-29

Ground beef patties containing 5, 10, 15, 20, 25 and 30% fat were evaluated raw and after cooking to either 71 or 77 C. Cooking losses were lowest for 5 - 20% fat patties (24.7 - 26.0%), intermediate for 25% fat patties (28.9%), and highest for 30% fat patties (32.1%). Low-fat patties (5 and 10%) were firmer in texture, more crumbly at end-of-chewing, less juicy and flavourful, and caused less oily coating

of the mouth than 20-30% fat patties. Warner-Bratzler and Lee-Kramer shear forces decreased as fat increased. Instron texture profile analysis also indicated greater peak forces, springiness, and cohesiveness for low-fat patties. Cooking to 77 vs 71 C accentuated differences in palatability between low- and high-fat patties. AS

2518

Pommier (SA). **Vitamin A, electrical stimulation, and chilling rate effects on lysosomal enzyme activity in aging bovine muscle.** *Journal of Food Science* 57(1); 1992: 30-35

2519

Lasta (J), Blackwell (JH), Sadir (A), Gallinger (M), Marcoveccio (F), Zamorano (M), Ludden (B), Rodriguez (R). **Combined treatments of heat, irradiation, and pH effects on infectivity of foot-and mouth disease virus in bovine tissues.** *Journal of Food Science* 57(1); 1992: 36-39

Beef steaks

2520

Harris (JJ), Miller (RK), Savell (JW), Cross (HR) and Ringer (LJ). **Evaluation of the tenderness of beef top sirloin steaks.** *Journal of Food Science* 57(1); 1992: 6-9, 15

Mutton

2521

Reddy (PV), Reddy (MS), Jayavardhan (M) and Reddy (GR). **Effect of electrical stimulation on certain biochemical and quality characteristics of mutton carcass.** *Indian Journal of Animal Science* 61(8); 1991: 906-908

Electrical stimulation (ES) of mutton carcass at 110 or 330 voltages showed no effect on total, soluble and structural proteins, total volatile nitrogen. Marked improvement in the keeping quality of meat by ES, which can be attributed to accelerating the lactic acid production and thereby inhibiting the growth of spoilage organisms was noticed. BV

Sheep

2522

Reddy (KA), Reddy (MS), Jayavardhan (M) and Reddy (KS). **Effect of electrical stimulation on certain quality characteristics of sheep carcass.** *Indian Journal of Animal Science* 61(8); 1991: 912-914

Electrical stimulation (ES) of the carcass had no significant effect on the carcass internal temp.

Mean pH between the control and electrically stimulated samples showed significant difference. In electrically stimulated carcasses 6.0 pH was attained in 2 h, whereas unstimulated carcasses required 12 h to attain the same pH. Both low (110) and high (330) voltage electrical stimulations brought down the pH to 6.0 within 2 h of stimulation. A gradual increase in exudation area as storage time increased, thereby decreasing water-holding capacity in 24 h of storage. ES samples had significantly less mean shear force values than control samples. Electrical stimulation and storage time had a significant effect on tenderness and overall acceptance scores. There were no significant differences between the voltages applied on tenderness and overall acceptance scores. BV

Pork

2523

Nanu (E), Narayan (KG) and Yadava (R). **Bacteriological quality of ready-to-eat pork kabab stored under marketing conditions.** *Journal of Food Science and Technology (India)* 29(5); 1992: 309-310

Samples of pork kabab from 8 batches, incubated at 37 C, were found to be free of *Salmonella*, sulphite reducing clostridia, coliforms, faecal streptococci and *Escherichia coli* at 0 and 8 days of storage. One sample yielded coliform at 44 C incubation while 2 samples were positive for staphylococci at 37 C. Mesophilic bacteria increased significantly as against no change in the count of psychrophilic bacteria upon storage for 8 days. The a_w of the product did not change to any appreciable extent. AS

Rabbit meat

2524

Aravind Reddy (M), Srinivasa Reddy (M), Ramakrishna Reddy (G) and Suresh Reddy (V). **Certain quality characteristics of rabbit meat as influenced by breed and sex.** *Indian Journal of Animal Science* 60(7); 1990: 896-899

Reindeer meat

2525

Penfield (MP), Swanson (RB), Mitchell (DS), Riemann (MJ) and Dorko (CL). **Restructured reindeer steaks: Effects of flake size, phosphate, and salt on sensory properties.** *Journal of Food Science* 57(1); 1992: 252-253, 255

Steaks, fabricated from forequarters from field-slaughtered Alaskan reindeer, were prepared from meat flaked to two sizes (1.295 and 1.095 cm), with (0.5%) and without phosphate, and with (0.5%) and without salt. Phosphate did not appreciably effect sensory properties. Larger flakes and salt improved quality and acceptability, therefore, additional steaks were fabricated from meat flaked with a larger cutting head (4.064-cm) and with 3 levels of salt (0.0, 0.5 and 0.75%). Steaks containing 0.75% salt were less chewy, softer, juicier, and more acceptable than those made with 0.5% salt but did not differ from those containing no salt. Feasibility of producing restructured steaks from reindeer forequarters was demonstrated. AS

Products

2526

Moore (TM), Skeiley (GC), Oilkington (DW), Halpin (E), Acton (JC), Grimes (LW). **Composition and palatability of country cured hams comparing hot boning, cold boning and intact hams.** *Journal of Food Science* 57(1); 1992: 1-5

2527

Kotzekidou (P). **Identification of staphylococci and micrococci isolated from an intermediate moisture meat product.** *Journal of Food Science* 57(1); 1992: 249-251

The identification of staphylococci and micrococci isolated from an intermediate moisture meat product, basturma, was studied. From the 120 isolates 92.5% were classified as staphylococci and 7.5% as micrococci. The differentiation of the species revealed: 42% *Staphylococcus epidermidis*, 32% *Staph. saprophyticus*, 12% *Staph. simulans*, 4% *Staph. carnosus*, 2% *Staph. hylcus* subsp. *hylcus* and 7.5% *Micrococcus varians*. AS

Poultry

Chickens

2528

Hsia (HY), Smith (DM) and Steffe (JF). **Rheological properties and adhesion characteristics of flour-based batters for chicken nuggets as affected by three hydrocolloids.** *Journal of Food Science* 57(1); 1992: 16-18, 24

Time-dependent (TD), apparent viscosity (AV), shear-thinning behaviour, recovery and adhesion characteristics were determined on 30% solids flour-based (equal amounts of modified starch, wheat flour, and yellow corn flour) batters containing hydrocolloids (guar (GG), xanthan (XG)

and carboxymethylcellulose (CMC)) at 0.25, 0.5 and 1.0%. Most batters were thixotropic. Batters containing XG showed greatest ($P < 0.5$) μ_0 viscosity followed in decreasing order by GG, CMC and control batter. AV correlated highly positively with batter adhesion characteristics measured on chicken nuggets as coating pickup, overall yield and cooked yield. Quantifying TD makes possible prediction of changes in batter AP with mixing time and makes possible scientifically based adjustments in batter formulation to maintain constant breading pickup. SRA

2529

Pandey (NK), Anand (SK), Mahapatra (CM) and Verma (SS). **Quality changes and shelf-life of frozen chicken stored at -18 C due to repeated electricity failure.** *Indian Journal of Animal Science* 61(11); 1991: 1255-1257

Electricity failure for 9 h daily resulted in significantly more storage and drip losses than for 6 h ones after 28 days of storage indicating more loss of moisture as drip due to longer freeze-thaw cycles. Microbiological studies revealed a significant increase in the counts of total aerobes and psychrotrophs increased significantly in both 6 and 9 h groups after 28 days of storage. There was a significant decrease in taste panel scores for appearance, flavour, juiciness, texture and overall acceptance, but flavour scores suffered most after 28 and 21 days in 6 and 9 h electricity failure respectively. The results suggest that frozen chicken were acceptable for 28 days even after exposure to repeated freeze-thaw cycles due to 9 h electricity failure daily, while it was acceptable only for 21 days when subjected to 9 h electricity failure. BV

2530

Reddy (VR), Sudhakar (J) and Rao (PV). **Carcass yield of chicken as influenced by bird type, age and dietary protein and energy.** *Indian Journal of Animal Science* 60(3); 1990: 365-369

The comparative carcass yields of sexed broilers and White Leghorn (WL) cockerels fed 2 levels of protein and energy were determined at 2 marketing ages. The per cent feather loss to live wt. was low in male broilers followed by those in female broilers and WL cockerels. Early age of slaughter favoured less feather per cent in male broiler but increased in cockerel, whereas it had no effect in broiler female. Dressed yields were more in male broiler whereas the eviscerated and ready-to-cook yields were higher in broiler female. Comparatively all carcass yields except giblets were low ($P < 0.05$) in WL cockerel. Among the bird types when age of slaughter was considered the female broiler at 42 days of age

yielded more eviscerated and ready-to-cook yield, while WL cockerel at 70 days yielded heavier giblets. Though the diet alterations significantly influenced all the carcass yields of sexed broilers, it had no effect in the case of cockerels. AS

2531

Pandey (NK), Anand (SK), Mahapatra (CM) and Verma (SS). **Effect of repeated freezing and thawing on physico-chemical, microbial and sensory characteristics of frozen chicken.** *Indian Journal of Animal Science* 60(12): 1990; 1495-1501

Physico-chemical properties, shelf-life and acceptability of frozen chicken were assessed in different seasons upon repeated freezing and thawing. There was a significant increase in storage and drip losses up to 4 freeze-thaw cycles during summer and rainy seasons. In winter, storage loss increased only after 5 cycles. Water-holding capacity of breast and leg muscles improved significantly as compared to control. Higher TBA values of breast muscles during summer, and of leg muscles during summer and rainy seasons were recorded over those for control. The extractability of sarcoplasmic proteins of breast and leg muscles showed no change whereas myofibrillar proteins increased. A decreasing moisture content of breast and leg muscles was noted only during rainy season after 1 freeze-thaw cycle. However, the total protein did not change. Total aerobic plate counts increased by 2 to 3 log cycles after 4 freeze-thaw cycles. The counts of coliforms, staphylococci and psychrotrophs followed a similar trend. However, the increase in bacterial number was significantly different in different seasons. The frozen birds could successfully withstand 3 freeze-thaw cycles during summer and rainy seasons and 4 cycles during winter. This observation was also supported by sensory evaluation. AS

2532

Szczawinska (ME), Thayer (DW) and Phillips (JG). **Fate of unirradiated *Salmonella* in irradiated mechanically deboned chicken meat.** *International Journal of Food Microbiology* 14(3/4): 1991; 313-324

Mechanically deboned chicken meat was irradiated at 0, 1.25 and 2.50 kGy (Cesium 137) and inoculated with *Salmonella dublin* ATCC 15480, *S. enteritidis* ATCC 9186 or *S. typhimurium* ATCC 14028. Samples were then stored at 5 C and 10 C and were subjected to microbiological analysis directly after irradiation and inoculation (time 0), and after 24, 72, 120, 168 and 216 h of storage. Samples stored at 20 C were examined at time 0 and after 6, 12 and 24 h of storage. Irradiation at 1.25 and 2.50 kGy caused an average reduction in bacterial levels of

2.23 and 3.44 logs, respectively. *S. dublin*, *S. enteritidis* and *S. typhimurium* showed very small, insignificant changes in numbers, during storage of meat for 9 days at 5 C. The final populations of *S. dublin* and *S. typhimurium* in samples irradiated before inoculation and stored at 10 C or 20 C were greater than the equivalent populations in samples which had not been irradiated before inoculation. Reduction of indigenous microflora in mechanically deboned chicken meat by irradiation may create better conditions for the growth of salmonellae and may thus increase the risk of salmonellosis when accidental contamination and temp. abuse occur after a radiation treatment. Therefore, irradiated mechanically deboned chicken meat should be properly refrigerated and protected against contamination. AS

Hens

2533

Kulkarni (VV), Yashpal Thakur and Narang (MP). **Effect of age and live weight on the carcass components of spent hens.** *Journal of Food Science and Technology (India)* 29(5): 1992; 326-327

The dressing % decreased significantly (P less than or equal to 0.05) with increase in live wt. The carcass components such as giblets, cuts and total inedible parts were more influenced by live wt. of the spent hens than age. AS

Products

Eggs

2534

Chung (SL) and Ferrier (LK). **pH and sodium chloride effects on emulsifying properties of egg yolk phosvitin.** *Journal of Food Science* 57(1): 1992; 40-42

The emulsifying properties of phosvitin dissolved in water and 0.1, 0.5 and 1.0 M NaCl were determined from pH 3 to 10. The change in its emulsifying activity (EA) with pH was slight but significant ($p < 0.05$) and emulsion stability (ES) was relatively high (68 - 73%), except at pH 5 (17%) and 10 (48%). The EA of phosvitin was higher than that of bovine serum albumin (BSA) at pH 3 or 8 and ES was higher than BSA at all pH levels except at pH 5 and 10. Added NaCl decreased in the EA of phosvitin at pH 3 and 10 and decreased the ES between pH 3 and 9. Increased instability of emulsions resulted mainly in coalescence of oil droplets at NaCl greater than or equal to 0.5M. Salt increased the viscosity of phosvitin emulsion only at pH 3 but not at pH > 5.

The viscosities of BSA emulsions were higher than those of phosvitin at pH 3, 5 or 8. AS

2535

Mine (Y). **Sulfhydryl groups changes in heat-induced soluble egg white aggregates in relation to molecular size.** *Journal of Food Science* 57(1); 1992: 254-255

The sulfhydryl content of heat-induced soluble egg white aggregates (SEWA) gradually decreased in proportion to standing time at room temp., and the mol. size of the aggregates continued to increase at least 4 days. The progress of SEWA was much inhibited by N-ethylmaleimide. SEWA are polymerized through a mechanism involving sulfhydryl-disulphide interchange and sulfhydryl oxidation during standing. AS

2536

Otles (S) and Hisil (Y). **Analysis of vitamin A in eggs by high pressure liquid chromatography.** *Die Nahrung* 35(4); 1991: 391-394

The HPLC procedure described for vitamin A is specific for retinol and rapid, precise and simple to perform in comparison with the standard methodology. Recovery of vitamin A was 97.1%. BV

Egg powder

2537

Morgan (JN) and Armstrong (DJ). **Quantification of cholesterol oxidation products in egg yolk powder spray-dried with direct heating.** *Journal of Food Science* 57(1); 1992: 43-45, 107

Outlet air temp. and nitrogen oxides (NO_x) in the combustion gases were the only conditions that affected cholesterol oxidation products (COPS) levels in egg yolk powder spray-dried with direct heating. At outlet temp. of 150 C, total COPS concn. in the spray-dried product were 75 p.p.m. at 5 p.p.m. NO_x and 213 p.p.m. at 300 p.p.m. NO_x. In products dried at 75 C outlet temp. total COPS concn. were 21 p.p.m. at 5 p.p.m. NO_x and 58 p.p.m. at 300 p.p.m. NO_x. In general COPS responded to outlet temp. and NO_x in the same manner as total COPS. SRA

SEAFOODS

Fish

2538

Nambudiri (DD) and Gopakumar (K). **ATPase and lactate dehydrogenase activities in frozen stored**

fish muscle as indices of cold storage deterioration. *Journal of Food Science* 57(1); 1992: 72-76

The effect of prolonged cold storage on muscle adenosine triphosphatase (ATPase) and lactate dehydrogenase (LDH) activities was studied in a variety of fresh water and brackish water fish. Decrease in enzyme activity was observed in all samples stored frozen (-20 C) over a period of 180 days. Highly significant negative correlation was observed between enzyme activity and frozen storage period with mullet, pearlspot, milk fish and tilapia. Significant linear correlations were observed between decrease in enzyme activities and other biochemical indices and sensory scores. The results indicated that loss of activities of ATPase and LDH in fish muscle was significantly related to early changes in quality of frozen stored fish. AS

2539

Luong (JHT), Male (KB), Masson (C) and Nguyen (AL). **Hypoxanthine ratio determination in fish extract using capillary electrophoresis and immobilized enzymes.** *Journal of Food Science* 57(1); 1992: 77-81

Fish freshness was assessed using capillary electrophoresis and an immobilized enzyme procedure to monitor degradation of inosine-5'-monophosphate (IMP), inosine (HxR) and hypoxanthine (Hx). The enzymatic method used an amperometric probe at + 0.7 V (platinum vs silver/silver chloride) with immobilized xanthine oxidase, catalase, nucleoside phosphorylase, and nucleotidase for converting Hx, HxR or IMP to uric acid. Capillary electrophoresis resolved IMP, inosine and Hx by migration rates resulting from an applied electric field (416 V/cm, 50 µA). Components were detected at 250 nm. The H ratio of Hx/[IMP + HxR + Hx] and simplified K value of [HxR + Hx]/[IMP + HxR + Hx] were determined in cod, salmon and trout stored on ice (0 - 4 C) and at 20 C. The 2 procedures agreed and for all species H ratio and K values increased with storage time. AS

Bass

2540

Boyd (LC), Green (DP) and LePors (LA). **Quality changes of pond-raised hybrid striped bass during chillpack and refrigerated storage.** *Journal of Food Science* 57(1); 1992: 59-62

Pond-raised hybrid striped bass were commercially processed into fillets with and without belly flap, packaged in oxygen permeable bags (Cryovac ETM), and stored as chillpack samples (-2 C) and as refrigerated samples (2 C). Quality changes were

determined over 21 days storage by microbiological, chemical and sensory evaluations. Aerobic plate counts and hypoxanthine formation showed evidence of rapid deterioration of refrigerated samples after 8 days storage compared to 21 days for chillpack samples. A trained sensory panel found 21 day stored chillpack samples similar in flavour and aroma but of firmer texture than refrigerated samples stored 8 days. Panelists found no differences between trimmed and whole fillets. Hypoxanthine formation and aerobic plate counts appeared to be good indicators of quality deterioration, whereas thiobarbituric acid measurements were not. AS

Hoki

2541

Macdonald (GA), Lelievre (J) and Wilson (NDC). **Effect of frozen storage on the gel-forming properties of hoki (*Macruronus novaezelandiae*)**. *Journal of Food Science* 57(1): 1992: 69-71

The possibility of using frozen hoki to make surimi was investigated. At intervals, fish were thawed under controlled conditions and gels were then made from minces of the flesh. Both puncture and torsion tests showed the quality of gels declined with duration of storage of frozen hoki. This decline was matched by a decrease in pH and an increase in formaldehyde concn. in the frozen flesh. The data suggest a land-based surimi plant could not be operated outside the harvesting season to any appreciable extent using frozen hoki stored at -29 C. AS

Rohu

2542

Sinha (DK), Choudhary (SP) and Narayan (KG). **Hygienic quality of rohu fish (*Labeo rohita*) sold in Ranchi town**. *Journal of Food Science and Technology (India)* 29(5): 1992: 308-309

The gills of Rohu fish (*Labeo rohita*) had higher bacterial load and faecal contamination indicative microorganisms followed by skin and muscles. On an av., Rohu fish sold was found to be of poor hygienic quality. AS

Sardines

2543

Krzynowek (J), Uljua (DS), Panunzio (LJ) and Maney (RS). **Factors affecting fat, cholesterol, and ω -3 fatty acids in Maine sardines**. *Journal of Food Science* 57(1): 1992: 63-65, 111

Maine sardines harvested June, July, October and November were analyzed for moisture, ash, fat, cholesterol, and fatty acids either as whole fish, raw dressed, steam precooked, and after canning in soy oil, menhaden oil, or in the liquid exuded after steam precooking (cookout liquid). Fat content ranged from 5% for juvenile herring samples June and October to 11% in maturing herring harvested prior to the spawning season in July. All canning liquids contributed to elevated fat content in the finished product. Herring packed in soy oil or cookout liquid had about 90 mg cholesterol/100g samples. Herring packed in menhaden oil had 100 - 115 mg cholesterol/100g. Herring packed in either of the two fish oil solutions contained significantly more ω 3 fatty acids and had a greater ratio of ω 3: ω 6 than those packed in soy oil. AS

2544

Sanchez-Muniz (FJ), Higon (E), Cava (F) and Viejo (JM). **Acceptability of diets containing olive oil fried sardines (*Sardina pilchardus*) in the prevention of dietary hypercholesterolaemia in rats**. *Journal of the Science of Food and Agriculture* 56(2): 1991: 155-165

The acceptability of diets containing fried sardines (*S. pilchardus* Walb) was studied for 4 wks in growing Wistar rats. Group 1 was fed with a diet containing casein and olive oil as protein and fat sources respectively, and groups 2 and 3 received diets containing sardines fried in olive oil which had been used a known number of times. Group 2 was fed with a mixture of fried sardines from the first and second oil-use occasions as the only source of protein and fat, while group 3 got a mixture of fried sardines from the eighth to tenth oil-use fryings. All diets contained cholesterol plus bovine bile as a blood cholesterol-raising agent. Food intake, body wt. increase and dietary efficiency ratio (DER) were all similar in groups 1 and 2, showing that the olive oil fried sardine diet was well accepted. However, group 3 ate significantly less ($P < 0.01$) and showed smaller ($P < 0.01$) body wt. increase and DER than groups 1 and 2. The hepatosomatic index of group 3 was higher ($P < 0.05$). The hypercholesterolaemic effect of group 1 diet was markedly reduced (5- and 15-fold after 2 wks and 4 wks respectively) in groups 2 and 3. AS

White amur

2545

Wempe (JW) and Davidson (PM). **Bacteriological profile and shelf-life of white amur (*Ctenopharyngodon idella*)**. *Journal of Food Science* 57(1): 1992: 66-68, 102

The bacteriological profile of fresh, frozen and spoiled white amur fish showed the presence of *Acinetobacter*, *Citrobacter*, *Enterobacter*, *Escherichia*, *Micrococcus*, *Moraxella*, *Pseudomonas*, *Staphylococcus* and *Streptococcus*. Storage studies on white amur flesh indicated that 4 C and 200 µg/mL sodium hypochlorite dip were most effective against coliforms. Packaging in 100% CO₂ significantly reduced aerobic plate count (APC). Freezing the flesh for 8 wk at -18 C reduced viable APC, psychrotrophs and coliforms. SRA

Products

Fish

2546

Sanjeev (S) and Surendran (PK). **Evaluation of reversed passive latex agglutination test kits for the detection of staphylococcal enterotoxins A, B, C and D in fishery products.** *Journal of Food Science and Technology (India)* 29(5): 1992: 311-312

The SET-RPLA kit for the detection of staphylococcal enterotoxins A, B, C and D showed high specificity and sensitivity with a min. detectable limit of 0.30 to 0.60 ng enterotoxin/g of fishery products. The test provides a simple, inexpensive means for semi-quantitative assay within 24 h. AS

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Wines

2547

Datta (S) and Nakai (S). **Computer-aided optimization of wine blending.** *Journal of Food Science* 57(1): 1992: 178-182, 205

An objective method was developed to blend wines for standardizing flavour quality. Aroma volatiles of varietal and white stock wines, and the target wine were analyzed by equilibrium gas headspace chromatography. Similarity of the aroma profiles of the varietal and stock wines to the target wine was calculated from GC peak areas. The simplex optimization program carried out computational blending to determine the ratios of the varietal and white stock wines that would be required to simulate

the aroma of the target wine. For two blending experiments, the computer optimized blend could not be differentiated from target wine by a sensory taste panel. AS

2548

Querol (A), Huerta (T), Barrio (E) and Ramon (D). **Dry yeast strain for use in fermentation of Alicante wines: Selection and DNA patterns.** *Journal of Food Science* 57(1): 1992: 183-185, 216

On the basis of the data collected from a study on microbial flora of Alicante wines at different stages of vinification, *Saccharomyces cerevisiae* strain which is capable of producing high quality wine in pilot fermentation experiments with musts was selected. The strain was characterized using several DNA fingerprinting techniques. These results open the way to use the strain as a dry yeast in order to perform controlled fermentations. CSA

2549

Arvanitoyannis (I), Fronimos (P) and Embeoglou (I). **Influence of some proteins on the contents of several metals in red wines.** *Die Nahrung* 35(4): 1991: 373-378 (De)

Addition of protein leads to an increase in Zn and Ca content, whereas the contents of Fe and Cu which can cause turbidity are decreased. BV

Non-alcoholic beverages

2550

Ezeonu (FC), Egboka (BCE) and Okaka (ANC). **Nitrate and nitrite in some non-alcoholic beverages and water supplies in Onitsha, Nigeria.** *Journal of Food Science and Technology (India)* 29(5): 1992: 329-330

Nitrate and nitrite analyses of about 200 water samples from different sources in Onitsha metropolis reveal that water from wells and boreholes are the most widely contaminated with 180 - 360 p.p.m. and 2.4 - 36.0 p.p.m. nitrate and nitrite, respectively. Presence of nitrate is attributed to the nitrate reductase activity of the microbial flora. Analysis of non-alcoholic beverages revealed an ubiquitous contamination of 0.33 - 3.48 p.p.m. of nitrite. AS

Coffee

2551

Malundo (TMM), Resurreccion (AVA) and Koehler (PE). **Sensory quality and performance of**

spray-dried coffee whitener from peanuts. *Journal of Food Science* 57(1): 1992: 222-226, 251

The feasibility of producing coffee whitener by spray drying peanut extracts was studied. The whiteners were spray-dried at 200 C using atomizer speeds of 15000, 25000, 35000 r.p.m. and volumetric flow rates of 0.6, 1.2, 1.8 l/h. Performance of the whiteners in coffee was evaluated vs commercial coffee creamers by a consumer panel. Objective tests for colour, solubility, and moisture were performed. The liquid whitener had lower performance and sensory scores than commercial samples ($p < 0.01$). Recommended processing conditions for spray drying liquid whitener from peanuts at 200 C include atomizer speeds in the 15000 - 29000 r.p.m. range and volumetric flow rates > 1.80 l/h. AS

2552

Gross (GA) and Wolleb (U). **2-Amino-3,4-dimethylimidazo[4,5-f]quinoline is not detectable in commercial instant and roasted coffees.** *Journal of Agricultural and Food Chemistry* 39(12): 1991: 2231-2236

A sensitive method has been developed for the isolation of 2-amino-3,4-dimethylimidazo[4,5-f]quinoline (MeIQ) from instant coffee and lyophilized home-brewed coffee. Sample cleanup was performed in four steps using Amberlite XAD-2, Extrelut/copper phthalocyanine-Sephasorb HP, Sephasorb HP, and propanesulfonic acid silica/octadecyl silica. The purified extracts were then separated by HPLC. To validate the procedure, picogram levels of [2- 14 C]MeIQ were added prior to extraction to the coffee samples; 61% and 49% of the added reference standard could be recovered in chromatographic fractions from purified instant and home-brewed coffee, as measured by liquid scintillation and Ames test mutagenicity (TA98, +S-9). At 600 and 60 p.p.t. spiking levels, clear signals were observed allowing the estimation of the detection limit for MeIQ to be about 5 - 10 pg/g of coffee beans. On this basis, MeIQ was not detectable in either sample of instant or roasted coffee. AS

Fruit juices

Fruit juice concentrates

2553

Pilando (LS) and Wrolstad (RE). **Compositional profiles of fruit juice concentrates and sweeteners.** *Food Chemistry* 44(1): 1992: 19-27

Sugar, non-volatile acid, mineral, and UV spectral profiles were determined for 7 commercial fruit juice concentrates - 'hard' pear, 'soft' pear, white grape, pineapple, prune, fig and raisin - and 3 sweeteners-invert beet, invert cane and high fructose corn syrup (HFCS). Sugar and non-volatile acids were quantitated by HPLC. Sugar analyses included glucose, fructose, sucrose and sorbitol content and non-volatile acid detn. included quinic, malic, citric, tartaric, shikimic, and fumaric acids. L-Malic content was also determined by enzymic procedures. Mineral composition was measured by induction coupled plasma spectroscopy. Fruit juice concentrates and sweeteners have characteristic compositional profiles that are useful for evaluating juice quality and authenticity. AS

FATS AND OILS

2554

Blumenthal (MM) and Stier (RF). **Optimization of deep-fat frying operations.** *Trends in Food Science and Technology* 2(6): 1991: 144-148

The paper discusses the means by which frying can be optimized in the simplest fryer; the batch operation that is used in all restaurant and fast food operations and industries. 24 references. GS

2555

Perez-Camino (MC), Marquez-Ruiz (G), Ruiz Mendez (MV) and Dobarganes (MC). **Quantitation of oxidized triglycerides for the evaluation of the total oxidation level in edible fats and oils.** *Grasas y Aceites* 41(4-5): 1990: 366-370 (Fr)

In this paper, quantitation of oxidized triglycerides is proposed as an objective measurement of total oxidation level in edible fats and oils. Detn. has been carried out using a combination of adsorption and size exclusion chromatographies. The reproducibility of the detn. is given. After oxidation, it is demonstrated that oxidized triglycerides are the only compounds increasing significantly in the samples. This group of compounds comprises primary and secondary oxidation products. AS

Fats

Sal fat

2556

Bhattacharyya (S) and Bhattacharyya (DK). **Enzymatic acidolysis of sal fat and its fractions.** *Oleagineux* 46(12): 1991: 509-513

Sal fat and its suitable fractions can be modified in respect of their fatty acid composition and thermal properties of enzymatic acidolysis reaction with 1,3-specific *Mucor miehei* lipase. The stearin fractions from acidolysed sal fat and sal olein display fatty acid compositions comparable to those of coco butter. The products also exhibit satisfactory thermal properties which indicate that the combination of enzymatic acidolysis with 1,3-specific microbial lipase like *Mucor miehei* and fractionation of acidolysed sal fat or its fraction sal olein can help in obtaining satisfactory coco butter like fats. AS

Oils

2557

Sridhar (R), Lakshminarayana (G) and Kaimal (TNB). **Modification of selected edible vegetable oils to high oleic oils by lipase-catalyzed ester interchange.** *Journal of Agricultural and Food Chemistry* 39(11); 1991: 2069-2071

High amounts of polyunsaturated fatty acids (PUFA) present in edible oils such as peanut, sunflower, safflower, soybean, and linseed oils are susceptible to oxidative deterioration and consequently could contribute to carcinogenesis and atherogenesis. Long-chain (C₂₀₋₂₄) saturated fatty acids (LSFA) present in the sn-3 position of peanut oil play a role in atherogenesis. Monounsaturated fatty acid, oleic acid, does not exhibit these adverse effects. Hence, the replacement of LSFA and PUFA in peanut oil and of PUFA in sunflower, safflower, soybean and linseed oils with oleic acid was investigated by a batch-stirred interesterification reaction of the oil in hexane with methyl oleate using 1,3-specific lipase (*Mucor miehei*) for 4 h. The triacylglycerols (TAG) of interesterified peanut, sunflower, safflower, soybean, and linseed oils were enriched with oleic acid from 48, 42, 13, 24 and 23% to 66, 63, 47, 54 and 56%, respectively. The TAG of peanut oil were depleted of LSFA from 6.6 to 2.0%. AS

2558

Broadbent (JH). **Low-cost methods of vegetable oil extraction for rural areas.** *Oleagineux* 46(10); 1991: 385-388

Historical and traditional methods of small-scale oilseed processing are outlined, and the raw materials generally available for village level extraction are indicated. Details of the pre-treatment of the oilseeds before extraction and consideration which have to be taken into account before establishing a small-scale oilseed extraction unit, such as an adequate supply of raw material, the local demand for vegetable oil are whether there will be social and economic benefits for the rural

community are discussed. Available equipment for the small-scale extraction of oilseeds, such as animal and mechanically powdered ghanis, manually and hydraulically operated presses and expellers, are reviewed, together with an equipment package consisting of a power source, decorticator, expeller, filter press and filter pump suitable for establishing a small mill. Details of a recent economic feasibility study of small-scale oilseed processing in Brazil carried out to assess whether it would be technically and economically viable, are described and the favourable result is reported. 6 references. AS

Cottonseed oils

2559

Hawash (S), Zaher (F) and El-Diwani (G). **Economic evaluation of miscella refining of cottonseed oil.** *Grasas y Aceites* 41(4-5); 1990: 357-360

The economic feasibility of cottonseed oil refining in miscella as compared to conventional refining technique followed in local oil plants was investigated. The study was based on the refining results on the semi-pilot scale reported by the authors in a previous article. Total costs and net income due to crude oil refining and bleaching were estimated on the basis of the actual processing rate in a local oil unit Tanta (200 tons crude oil daily). In general, the technique of miscella refining was found to be more profitable than the conventional refining technique. An extra profit equivalent to 8.87 million Egyptian pounds per year could be achieved by refining 80% miscella using 75% of the recommended quantity of alkali, rather than by conventional refining technique. AS

Soybean oils

2560

Bhagya (S) and Srinivas (H). **Extraction of soybean (*Glycine max.*) with hexane - acetic acid: Effect on oil quality.** *Food Chemistry* 44(2); 1992: 123-125

Soybean flakes were extracted in a Soxhlet extractor with hexane and hexane containing different concn. of acetic acid for different periods. A concn. of 3% acetic acid in hexane and extraction for 3 h were found to be optimum for max. extraction of total lipids and phospholipids. Compared to hexane, acidic hexane extracted 5.8% and 191.3% more total lipids and phospholipids respectively. Quality characteristics of acidic hexane-extracted oil showed that the Lovibond colour intensity and free fatty acid (FFA) content were higher compared to hexane-extracted oil. However, the fatty acid composition did not show any changes. AS

SPICES AND CONDIMENTS

Cardamom

2561

Gopalakrishnan (N) and Narayanan (CS). **Supercritical carbon dioxide extraction of cardamom.** *Journal of Agricultural and Food Chemistry* 39(11); 1991; 1976-1978

Cardamom (*Elettaria cardamomum* Maton) seeds were extracted with supercritical carbon dioxide at different conditions of pressure, temp., contact time, and moisture content to estimate the yield and compositional variations. The yield of cardamom extract was found to be fairly constant at different conditions of extraction, but the non-volatiles and chlorophyll contents varied in the extract with extraction parameters. The proportion of the minor and major components also showed variations under different conditions of extraction. AS

2562

Kubo (I), Himejima (M) and Muroi (H). **Antimicrobial activity of flavour components of cardamom *Elattaria cardamomum* (Zingiberaceae) seed.** *Journal of Agricultural and Food Chemistry* 39(11); 1991; 1984-1986

The antimicrobial activity of the 10 most abundant volatile components of the cardamom (Maton) seeds has been tested against 14 microorganisms. All of the compounds tested exhibited activity against at least one or more microorganisms. BV

Tamarind kernel powder

2563

Vinay Jambhulkar and Shankhapal (KV). **Effect of minerals on lipid production by *Rhizopus nigricans* and *Penicillium nigricans* on tamarind kernel powder.** *Journal of Food Science and Technology (India)* 29(5); 1992; 333-335

The role of various metal ions at different concn. on lipid production by *R. nigricans* and *P. nigricans* in tamarind kernel medium indicated positive role of Mg, K, ferric and Zn ions, in contrast to negative effect of Ca ion. Cu and Mn affected lipid production by *R. nigricans* and *P. nigricans*, respectively. AS

SENSORY EVALUATION

2564

Elejalde (CC) and Kokini (JL). **Identification of key textural attributes of viscoelastic syrups by regression analysis.** *Journal of Food Science* 57(1); 1992; 167-171

Regression analysis was used to identify key textural attributes in the sensory evaluation of table syrups with varying viscoelastic properties. The syrups were sensorily evaluated in the mouth, while being poured out of bottle and while the syrup was spreading on a flat surface. The triplet "Viscous", "Smooth", and "Slippery" gave the best average coeff. of detn. (R^2) in the mouth; the triplet "Watery", "Even", and "Drippy" gave the best R^2 for pouring; and the triplet "Viscous", "Even", and "Smooth" the best R^2 for spreading. The results suggested that there were significantly different texture perception cues in the three different evaluation procedures. AS

2565

Barrett (AM), Normand (MD), Peleg (M) and Ross (E). **Characterization of the jagged stress-strain relationships of puffed extrudates using the fast fourier transform and fractal analysis.** *Journal of Food Science* 57(1); 1992; 227-232, 235

The jaggedness of the stress-strain relationship of two kinds of puffed extrudates stored under different humidity conditions was assessed by the power spectrum of the Fast Fourier Transform and the natural Fractal dimension of normalized compression curves. Both analyses, performed with a micro-computer, provided a consistent measure of jaggedness. The apparent Fractal dimension, obtained using the Blanket algorithm, was the most convenient measure of overall ruggedness since it was expressed by a single number. The power spectrum that resulted from the Fourier transform, however, could be used to identify the length scale of structural features where fracture takes place, and its shape could be more directly related to structural features and textural properties. AS

2566

Portmann (MO), Serghat (S) and Mathlouthi (M). **Study of some factors affecting intensity/time characteristics of sweetness.** *Food Chemistry* 44(2); 1992; 83-92

The effect of temp. on sweetness intensity of D-glucose, D-fructose and sucrose in water between 2.3 and 9.2% (w/v) was not significant due to solvent interactions and structure-maker effect of sugars in water. The slight decrease in sweetness of fructose as temp. is raised probably comes from multirotation rate which increases and provokes the transformation of the most sweet isomer (β -pyranose) into a less sweet one (β -furanose).

Persistence of sweet taste does not change significantly when temp. is increased. Increase of viscosity depresses intensity and persistence probably due to a masking of receptor site by viscosity enhancer maltodextrins. The viscometric and volumetric parameters on the one hand and by decomposition of Raman spectra in the region of OHs on the other reveal the effects of sugars and temp. on water structure whose perturbation may be deduced. SD

2567

Padmanabhan (M) and Bhattacharya (M). **Rheological measurement of fluid elasticity during extrusion cooking.** *Trends In Food Science and Technology* 2(6): 1991: 149-151

This review discusses the exit-pressure and hole-pressure methods for the on-line measurement of fluid elasticity, and the application of these methods to the control of the extrusion cooking process of fluid food. The potential application of the methods to the rheological characterization of viscoelastic fluid foodstuffs in general is also discussed. 21 references. GS

2568

Chiralt (A), Galotto (MJ) and Fito (P). **Changes in rheological properties and particle-size distribution during the manufacture of 'Xixona Turron'.** *Journal of Food Engineering* 14(2): 1991: 117-128

The so-called 'boixet' step is assumed to be the most important one in the process for manufacturing 'Xixona turron'. In this work the physical changes occurring during this step have been studied. An attempt has been made to explain the role of major turron components in this change by using rheological measurements and particle-size analysis techniques. Thixotropic behaviour has been characterized by the Hahn model. A model that describes the structural changes in the product has been proposed. AS

2569

Lundahl (DS) and McDaniel (MR). **Influence of panel inconsistency on the outcome of sensory evaluations from descriptive panels.** *Journal of Sensory Studies* 6(3): 1991: 145-157

Magnitude interaction and non-perceivers or non-discriminators, when small panel of 5 - 15 are used, had no significant effect on the test result. Cross-over discrimination increases type II error when panelists are considered as random effects while false discrimination on the type I error when panelists are considered as fixed effects. The

methods to reduce these errors on test result is discussed. SD

2570

Naes (T) and Solheim (R). **Detection and interpretation of variation within and between assessors in sensory profiling.** *Journal of Sensory Studies* 6(3): 1991: 159-177

The theoretical background on detection of variation within and among panelists is explained. The method is illustrated from the data on sensory evaluation of 4 sausages showing clearly the reproducibility of individual assessors and different types of differences among them. SD

2571

Fletcher (L), Heymann (H) and Ellersieck (M). **Effects of visual masking techniques on the intensity rating of sweetness of gelatins and lemonades.** *Journal of Sensory Studies* 6(3): 1991: 179-191

Raspberry gelatins with 9, 10, 14 and 16% sucrose and lemonades with 8, 10, 12 and 14% sucrose were rated for sweetness under visual masking conditions (red lights, red glasses, dyes and blindfolds) and a white light and clear glasses control condition. Visual masking did not significantly affect the sweetness rating. SD

FOOD STORAGE

2572

Mannapperuma (JD), Paul Singh (R) and Montero (ME). **Simultaneous gas diffusion and chemical reaction in food stored in modified atmospheres.** *Journal of Food Engineering* 14(3): 1991: 167-183

A mathematical model based on simultaneous gas diffusion and chemical reaction was developed to represent the gas exchange in foods stored in modified atm. The respiration process was modeled as a first order chemical reaction and the gas transfer process was modelled as ordinary diffusion. The resistance of the skin to gas transfer was modeled as a convective type boundary condition. A steady state solution of the model was obtained. Respiration rate, av. internal gas concn., and gas concn. under the skin were measured using 'Golden Delicious' apples. The experimental methods were analyzed based on the model to determine the properties of apples. The experimentally determined values of the properties were diffusivity of the flesh to O₂ $2.67 \times 10^{-9} \text{ m}^2/\text{s}$ and to CO₂ $3.28 \times 10^{-9} \text{ m}^2/\text{s}$, conductance of the skin to O₂ $290 \times 10^{-9} \text{ m/s}$ and to CO₂ $220 \times 10^{-9} \text{ m/s}$, and first-order reaction rate constant $7.71 \times 10^{-6} \text{ s}^{-1}$. These

parameters were used in the model to simulate the internal gas concn. profiles. AS

INFESTATION CONTROL AND PESTICIDES

2573

Povey (SR) and Sibly (RM). **No oviposition plasticity in *Sitophilus oryzae* (L.) (Coleoptera: Curculionidae).** *Journal of Stored Products Research* 28(1); 1992; 11-14

No evidence for oviposition plasticity (a phenomenon whereby some insects reduce egg laying in poor conditions and increase it when conditions improve) was found in *S. oryzae* after either 2 or 4 wks exposure to poor oviposition conditions (stale wheat grain or flour). BV

2574

Arthur (FH) and Zettler (JL). **Malathion resistance in *Tribolium confusum* Duv. (Coleoptera: Tenebrionidae): Correlating results from topical applications with residual mortality on treated surfaces.** *Journal of Stored Products Research* 28(1); 1992; 55-58

Nine *T. confusum* Duv. field strains were exposed on galvanized steel and plywood panels treated with malathion at 1.63 g a.i. per 0.28 m². Resistance frequencies for these strains were measured by topical application of a discriminating dose of 300 p.p.m. per 0.5 µl per insect. Residues on galvanized steel controlled a susceptible laboratory strain for 5 wks and 3 susceptible field strains for 3 wks. Six resistant field strains were controlled for approx. 1 wk. Known resistance frequencies were correlated to residual mortality on galvanized steel for 1-6 wks. Residues on plywood were nearly 100% effective against all field strains and the susceptible laboratory strain for 12 wks. AS

2575

Saxena (BP), Sharma (PR), Thappa (RK) and Tikku (K). **Temperature induced sterilization for control of three stored grain beetles.** *Journal of Stored Products Research* 28(1); 1992; 67-70

Stored grain beetles (*Trogoderma granarium*, *Tribolium castaneum* and *Callosobruchus chinensis*) pupae of 1, 2 and 3 days old were exposed to 30, 40 and 45 C for 24, 48 and 72 h respectively for each group. Emergence of *Tri. castaneum* and *C.*

chinensis adults were totally prevented by 48 and 72 h exposures to 45 C. In *Tro. granarium*, the inhibitory effect was greater with male pupae and the resultant adults were completely sterile. BV

BIOCHEMISTRY AND NUTRITION

2576

Huang (AS) and Byerly (DS). **Sorption isotherms and light stabilities of aluminum laked riboflavin 5'-phosphate.** *Journal of Food Science* 57(1); 1992; 245-248

Aluminum oxide was used to insolubilize (i.e. to lake) riboflavin 5'-phosphate (FMN) to improve the light stability of vitamin B₂. HPLC was used to determine adsorption percentage and light stabilities of laked FMN. The adsorption of FMN on aluminum oxide was very effective. An FMN content of 55% in lake was achievable, with adsorption of 91%. The adsorption isotherm was of the Langmuir class, and differed from the desorption isotherm. The stabilities of laked FMN at different light intensities and a_w values were significantly (p = 0.05) higher than those of free FMN. AS

2577

Funk (MA) and Baker (DH). **Effect of fiber, protein source and time of feeding on methotrexate toxicity in rats.** *Journal of Nutrition* 121(10); 1991; 1673-1683

Fiber sources tested in these exp. had little effect on methotrexate (MTX) but the inclusion of soybean concentrate in the semi-purified diet totally alleviated MTX-induced toxicity symptoms. Also, the time during which diets are fed alters their potential to exacerbate or alleviate toxicity. Giving a soybean-based enteral product near the time of MTX dosing may minimize development of toxicity. BV

TOXICOLOGY

Nil

FOOD LAWS AND REGULATIONS

Nil

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